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VOLUME 35

NUMBERS 1 and 2

Vol. 35

~~JANUARY & APRIL~~

1961

Entered at Post Office
(S. C. E. R. T.)
Date..... 9.3.8
Acc..... J. 723

NATIONAL INSTITUTE
OF INDUSTRIAL PSYCHOLOGY
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OCCUPATIONAL PSYCHOLOGY

JANUARY and APRIL 1961

VOLUME 35 Nos. 1 and 2

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Occupational Psychology is published quarterly in January, April, July and October by the National Institute of Industrial Psychology. From January 1932 to December 1937 the Institute's Journal appeared monthly under the title *The Human Factor*; from January 1938 to December 1931 it appeared quarterly under the title *The Journal of the National Institute of Industrial Psychology*. The subscription rate for *Occupational Psychology* is 40/- a year. The National Institute of Industrial Psychology is a scientific association whose aim is the development of occupational psychology in Great Britain. Particulars of its work and information about membership can be obtained on application to the Secretary, NIIP, 14 Welbeck Street London, W.1.

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THE ECONOMIC JOURNAL

The Quarterly Journal of the Royal Economic Society

No. 281

MARCH, 1961

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OCCUPATIONAL PSYCHOLOGY

JANUARY AND APRIL 1961

VOLUME 35

NUMBERS 1 and 2

Shift Changes and Hours of Work*

By J. WALKER

(Medical Research Council, Industrial Psychology Research Unit)

NIGHT work is often spoken of as unnatural by those who work at night, and it is undesirable except in times of emergency or when the nature of the work demands it. It is not surprising that most of the research on the effects of night work has been carried out, until recently, in periods of national emergency during and just after the two wars. There is increasing interest now as process industries expand, and shifts are also worked in undertakings where the maximum use of plant is required.

Research during the two wars or in the unsettled times immediately after them had some advantages. The hours at night were often long and the conditions both inside the factory and at home were arduous. Examination of shift working under these extreme conditions can give insight into effects which may be masked when conditions are normal. Nevertheless, it is not satisfactory to rely on evidence about shift times and cycles which was obtained when the weekly hours of work were between 50 and 60, and one of the main purposes of this paper is to demonstrate the need for replication and development of the earlier studies.

One of the main grounds for believing that night work is undesirable is the disturbance to the bodily rhythms and habits which are associated with the diurnal cycle. The physiological cycle which has been known longest is the fluctuations of the body temperature during the 24 hours; temperature is normally highest in the afternoon and lowest between 12 midnight and 6 a.m. It is known that if the pattern of work and rest is altered so that sleep is taken during the day the temperature cycle adapts and an inversion occurs. Lewis and Lobban (1957) have recently shown that subjects living on 21 and 27 hour time cycles adapt their body temperature rhythm within one or two days. Teleky (1943), reviewing earlier studies, concludes that men active at work usually show a temperature inversion within a week but on light work, in this case nursing, complete inversion did not take place even after four weeks on a night shift. Reversion to the normal rhythm after a night shift appears to take a shorter time. There are many individual differences in temperature rhythm and in the facility with which adaptation occurs. It has been shown that work

*A paper read to the Occupational Section of the British Psychological Society in November, 1960.

efficiency fluctuates concomitantly with the temperature cycle so that on night work performance is lowest in the early morning. Kleitman (1938) has shown that speed of reaction time is related to body temperature and evidence has been put forward that the delay of switchboard operators in answering calls (Browne, 1949) increases in the early morning and the accuracy of recording information from dials and instruments (Bjerner, Holm and Swensson, 1955) declines in the early hours of the morning.

Habits of eating and sleeping also take time to adjust when a man changes to working during the night and sleeping by day. This kind of evidence has led to the suggestion that a long shift cycle is preferable to a short cycle; so that over a long spell on nights a man may become physiologically accustomed and avoid frequent changes; for example, a weekly cycle never allows him to become adapted to the night shift.

It is not permissible to make the assumption from these results that performance falls off and health is affected on the night shift in the usual industrial situation. In fact, Vernon (1940) writes that men permanently working on shifts for the whole of their working lives, such as steel workers, do not appear to suffer in health as a result. Comparisons of productivity, both in this war and the last, have shown that it was approximately the same or only slightly less on the night shift than on the day shift. Nevertheless, there is the evidence from men's opinions that the night shift is unpleasant, that it cuts down the amount of sleep, that it causes digestive disturbances and leads to irritability.

Much of the work on shifts in industry has relied on the collection of opinion. This is because it is difficult to obtain objective evidence of the effects of night work, if there are any, on output, accidents and sickness absence. It is very difficult to obtain a ~~control~~ group of men with which to compare shift workers. A comparison of the productivity of day workers and shift workers may be impracticable, as they are usually on different work. Further, the factory conditions are never the same during the night as during the day. There is often less supervision and less maintenance at night. In comparing shift workers with other groups of day workers, it must be noted that they will be selected men. Men are frequently excused shift work and remain on day work on grounds of ill health or age. Others who are unfit for or disinclined to work shifts find employment elsewhere. It is probably not surprising in view of the difficulties that objective measures of the effect of shifts are meagre: where objective measures have been used one of the most fruitful methods has been to compare the performance of the same group of shift workers at different times in the shift cycle, for example, on different weeks of the day shift or night shift.

Three studies of shift working will be described, but before doing so it is necessary to formulate the questions at issue. Management may have no control over the working of a night shift, but where it is worked there is some freedom in deciding how long the shift cycle should be and the starting and stopping times of the different shifts. It is important to know if some arrangements are optimum and others undesirable.

The first study (Wyatt and Marriott, 1946) took place immediately after the war. A group of undertakings (cable companies and power stations) had worked on a three shift system before the war. In 1940, due to the heavy bombing and the difficulty of getting to work, the men on the afternoon shift stayed on until the following morning. The hours of work were:

Pre-war system

Morning shift	8 a.m. to 3 p.m.
Afternoon shift	3 p.m. to 11 p.m.
Night shift	11 p.m. to 8 a.m.

16 hour shift system

1st week:	4 p.m. to 8 a.m. (Tuesday, Thursday, Saturday)
2nd week:	4 p.m. to 8 a.m. (Monday, Wednesday, Friday)
3rd week:	8 a.m. to 4 p.m. (Monday to Saturday)

Thus, the new shift hours were a 16 hour night shift, followed by a 32 hour break, for three nights in two weeks followed by a week of six 8 hour day shifts. At the end of the war the management and the trade unions wished to return to a more normal three shift system but the men were disinclined to do so and wished to continue working these exceptional hours. In the cable telegraphy company studied, there were 121 men in the group. Eleven of these had been taken off the long shift and put on day work for health reasons; and thirteen had reverted at their own request to the three shift system.

It was not possible to examine output and accidents because there were no suitable measures of productivity, and the number of accidents was negligible. It was possible to examine sickness absence for a period of five years before the war when the men were on the old shift system and compare the level with a five year period from 1941-1945. Although sickness had increased substantially it was impossible to say if any of the increase was due to the long shift or to other reasons associated with war conditions.

In the interviews which were designed to compare attitudes to the three shift system and to the alternate night shifts, there was a strongly expressed preference for the long shift. Eighty-eight per cent of the men liked it because the 32 hour break between night shifts provided more time at home and for social life. The long alternate nights' sleep between shifts was mentioned by 65% of the men and most of them said that they went to work fresher on the alternate night shift than on the successive nights of the three shift system. Many said it was better for health and caused less digestive disturbance and most meals could be taken at normal times. Perhaps the most vivid way of showing the general preference for the long shift is by quoting two of the comments.

"One of the many advantages of the 16 hour night shift is the social side and the time you get at home. I can now do quite a lot of things and can keep pace with friends, play games, take the kiddies out, or go to a show. I couldn't do these things on the three shift system because I didn't feel like it. Everything fits in better at home and things run very smoothly."

"During the 30 years I've been here I've never had as much time to myself as on the 16 hour shift. It is not as tiring as a week on the ordinary night shift and I've been much better in health. If I feel a bit groggy when I get home in the morning I can go to bed and don't need to get up. It gives you a chance to get over minor ailments and you are fit for work the next day without having missed a shift."

The investigators add that the quotations scarcely reflect the enthusiasm with which the men viewed the 16 hour alternate night shift compared to the three shift system. To present a balanced account it must be remembered that 13 of the men had voluntarily gone back to the three shift work and a few of the others preferred three shifts. There were also some complaints about the long shift and fatigue at the end of it.

Nobody would make the bizarre suggestion that a 16 hour shift is advisable, but Wyatt and Marriott write in their discussion of the results: "To most of these men the idea of a 16 hour shift was, at the outset, ridiculous and fantastic and contrary to established practice. Only after they had worked for some time on this system did they begin to realise and appreciate its advantages, and their favourable impressions were strengthened as their experience increased." The authors suggest that if any more research is carried out on the long shift, it would be possible, as hours of work are reduced, to shorten the night shift to 14 hours and increase the length of the day shift correspondingly. The problem is not the comparison of the merits of an 8 hour day shift with the long shift: but the conventional 3 shift system with consecutive night work as compared to the long alternate night shift. The study illustrates in an extreme case the extent to which hours can be rearranged on three shift systems.

There is evidence that this example of a shift system with long hours at night is not unique, although it may be unusual. The study was described to a management seminar on shift work. One member stated that when shift working was required in his organisation the most popular shift was one which involved working for 14½ hours on three successive nights followed by three days off. In another undertaking the 16 hour shift which had been introduced during the war was still operating, and two members of the seminar had experience of alternating 12 hour shifts. Workers were prepared, it seemed, to work unusually long hours on a night shift in return for extended periods of rest and leisure.

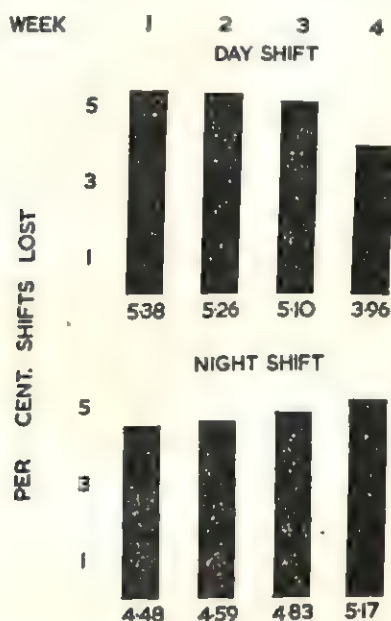
The second investigation (Wyatt and Marriot, 1953) was also carried out during and immediately after the war and was concerned with day and night two shift systems. The feature relevant to the present discussion was that the shift systems included some which changed between days and nights weekly, some fortnightly, and others monthly. The study tried to ascertain which shift cycle was preferable.

It was possible to collect some objective measures of behaviour. The first of these, absence from work, showed that it was considerably higher on the day shift than on the night shift. This was partly due to the difficulty of sorting out from the records men who worked on the day shift and those

who worked on the two shift system. The day shift was always much larger than the night shift and included men who were unfit for night work. This, of course, bears on the problem of obtaining a control group with which to compare shift workers which was discussed earlier.

However, the absence of 431 men who worked on the day and night shifts changing monthly was recorded on successive weeks of the day shift and the night shift. Fig. 1 shows the percentage lost time on the different weeks and it is seen that there was still more absence on the day shift. Among the possible reasons for this are more interesting and compelling attractions outside the factory during the day, and payment of a shift allowance at night acting as an incentive to attend.

FIG. 1: SHIFTS LOST AS A PERCENTAGE OF POSSIBLE SHIFTS IN SUCCESSIVE WEEKS OF THE DAY AND NIGHT SHIFTS



Another way of looking at these figures is to compare the absence on different weeks of the day and night shifts. Absence on the night shift was lowest in the first week and gradually increased until it was highest in the fourth week. On the day shift the converse occurred and the absence rate was highest in the first week of the day shift and declined in subsequent weeks. The same effect was shown on the cycle which changed fortnightly. Absence being higher in the second week of the night shift and in the first week of the succeeding day shift.

An attempt was also made to compare output on the day and night shift. It was first of all necessary to obtain groups of workers where the rate of working was under their control and not that of the machine, where the time cycle was fairly short and where output was affected by individual ability and capacity. Of ten factory groups which fulfilled these conditions

8 showed a small increase of output on the day shift, the largest differences being just over 2 per cent. It was also shown that output on the first week of the day shift was lower and tended to increase in the subsequent week, but there was no apparent trend on different weeks of the night shift.

In three of the factories 50 men were interviewed. One factory changed shifts weekly, the second fortnightly and the third monthly. The men said that their eating and sleeping habits were upset by the changeover on to nights, although most of them had adapted their sleeping habits, at least, by the end of the first week.

The men's preferences for changing shifts weekly, fortnightly or monthly were not of much help in determining the best cycle. It was found that most of them preferred the existing system irrespective of which it was. It is not unusual to find, in industry, that satisfaction increases as workers become accustomed to their environment: for example, previous studies on the effects of the double day shift (Smith and Vernon, 1928; Brown, 1959) have shown that preference for this shift system as compared to day work increased in factories where it had been experienced longest.

Wyatt's and Marriott's results from the absence and output records confirm the earlier findings of the Health of Munition Workers Committee (1917, 1918) in the first world war. It was shown that absence on a shift system which alternated fortnightly was higher on the second week of the night shift and the first week of the day shift and lower on the second week of the day shift and the first week of the night shift. Similarly, measures of productivity showed (Vernon, 1940) that it decreased from the first to second week of the night shift and increased from the first to second week of the day shift.

Both field studies point to increasing strain throughout the period on nights which is gradually dissipated on the following day shift. Results from absence and output measures tend to conflict with the physiological evidence that less frequent changes are desirable. The field investigations do not suggest that any physiological adaptation which may occur prevents a progressive accumulation of 'fatigue' on the night shift. Over the rest days or week-end breaks most night shift workers tend to revert to normal habits of eating and sleeping and this is one factor which would interfere with adaptation to night work.

The third study was concerned with shift starting and stopping times on three shift systems (Shepherd and Walker, 1956). The single shift absence of about 600 men in a large iron and steel works was tabulated. About half the men worked on a continuous 21 shift cycle throughout the whole year. The other 300 men worked on a discontinuous 17 shift cycle. The starting and stopping times of the shifts were:

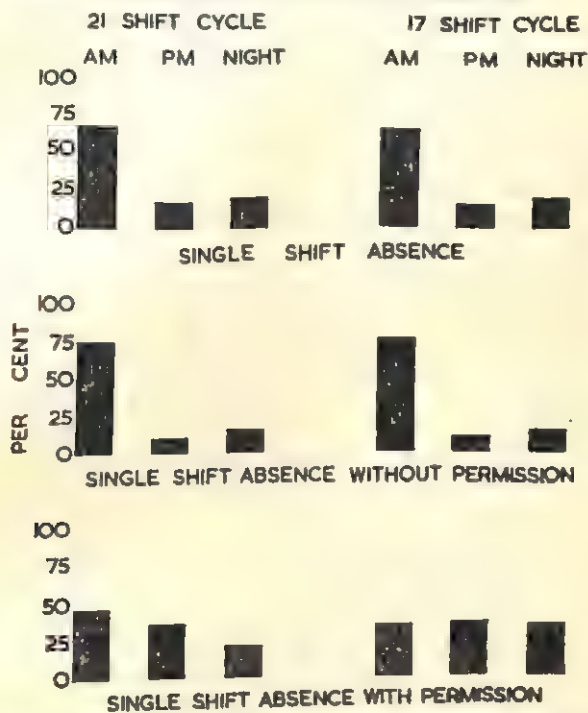
Mornings	-	-	6 a.m.	to	2 p.m.
Afternoons	-	-	2 p.m.	to	10 p.m.
Nights	-	-	10 p.m.	to	6 a.m.

On the 21 shift cycle the men worked seven shifts at a stretch followed by a rest break. On the 17 shift cycle the working periods were 6 morning

shifts, 5 afternoon shifts and 6 night shifts, so that the risk of absence on the afternoon shift is less than the other two.

Fig. 2 shows the proportion of single shift absences on the morning, afternoon and night shifts and the proportions for absence without permission or casual absence, and absence with permission or leave separately. On both shift systems about 65 per cent of single shift absence occurred on the morning shift, 18 to 19 per cent on the night shift and 15 to 17 per cent on the afternoon shift. When the single shift absence was subdivided about three-quarters of the single shift casual absence occurred on the morning shift but leave was spread more evenly over the three shifts.

FIG. 2: THE PROPORTION OF SINGLE SHIFT ABSENCE ON THE MORNING, AFTERNOON AND NIGHT SHIFTS



Before interpreting these figures it was necessary to test a number of possibilities. The high casual absence on the morning shift could have been due to a large amount of absence on Saturday morning. When single shift absence on different days of the week was compared there was more Saturday morning absence; about 5 per cent. more than the average for the other morning shifts. This was not sufficient to explain the trend. The casual absence on mornings could also have been due to a few men—'bad attenders'—who had many absences. This, however, was not the case, for it was found that 'good attenders', that is to say men who had only one or two absences in the year, still took three-quarters of this on the morning shift.

Finally, there was the possibility that shift allowances were acting as an incentive to attend on the night shift. This was examined on the 21 shift

cycle. No shift allowances were paid on week-days, but at the week-end five shifts were paid at time and a quarter. When the numbers of absences on these shifts were compared with the average numbers on the appropriate week-day shift there was no evidence that the shift allowance affected absence.

It was suggested that the interpretation of the high absence on the morning shift would be found in the difference in distribution for leave and casual absence. The classification of absence is notoriously unreliable, but it seemed reasonable to assume that a day's leave is usually planned and permission sought and granted before the leave is taken. In this sense leave may be thought of as intentional or premeditated absence. Casual absence on the other hand is often unpremeditated and it was suggested that the high casual absence on the morning shift was largely of this nature. On the morning shift some men probably overslept, possibly when they were off colour. To arrive at 6 a.m. nearly all of them would need to get up at 5 a.m. or earlier. It was, also, only during the week on mornings that they had a full evening free for social engagements. On the afternoon shift they leave work at 10 p.m. and on the night shift they start at 10 p.m. It seemed that the absence on the morning shift was due to the early morning start and this might be considered when arranging the starting and stopping times on three shift systems. Shift hours may be from 7 a.m. to 3 p.m., 3 p.m. to 11 p.m. and 11 p.m. to 7 a.m., or if transport is difficult at 11 p.m., it is possible to make the night shift half an hour or an hour longer and reduce the length of the other shifts. More research is required to find out if a rearrangement of hours would reduce the absence on the morning shift or distribute it more evenly over the shifts.

No attempt has been made, in this paper, to describe the social consequences of night work or the effects on domestic life, but, as has been shown by Banks (1956) and Brown (1959), these would have to be taken into account in arriving at conclusions. It must, also, be noted that the objective measures recorded in the field studies are only indirectly related to the effects of night work. There are a great many factors affecting output, absence or other objective measures which have no connection with shift work. It would only be if shift work had some marked effect, for example, on health that it would be strongly reflected in the sickness absence rate, and for those workers who remain on shift work this is not the case.

On three shift systems the alternation of shifts generally takes place weekly, although there are isolated instances of unusual systems such as the 16 hour shift. There are many disadvantages in a three shift system with a weekly change, both of a social nature and the necessity of adapting to three routines, but there seems to be less opportunity of lengthening the shift cycle than on the alternating day and night shift. However there could be some flexibility in arranging the starting and stopping times which would repay investigation rather than allowing the times to be determined by custom and habit.

On alternate day and night shifts no firm conclusions emerge about the optimum arrangement of the shift cycle, from the work which has been described. Teleky (1943) in his review of the physiological effects of night work recommends, tentatively, that a monthly changeover is to be preferred. The Health of Munition Workers Committee (1918) also point, cautiously, to the desirability of a long period on nights. Wyatt and Marriott (1953) suggest, as a compromise, that a fortnightly change is probably best on the day and night shift. Vernon (1940) does not make a recommendation but points out the difficulty which the night worker has in adapting his habits because sleep during the day is often disturbed and the reversion to a day-time routine at the week-end break interrupts the processes of adaptation. He suggests that when the "workers change shifts at weekly intervals any extra fatigue experienced from the week of night work is recovered from during the course of the subsequent day shift week". It may be that the physiological, psychological, social and domestic advantages and disadvantages are balanced on each shift cycle so that a weekly, or fortnightly or a monthly change are equally acceptable. This is an unsatisfactory conclusion which cannot be accepted until more information is available on the effect of shift work under modern conditions and with the present hours of work.

ACKNOWLEDGMENTS

The author wishes to thank Mr R. Marriott for his advice and for making available the study on the 16 hour shift system.

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Nurses' Ratings of Patient Welfare as Criterion Measures in the Health Sciences

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A major obstacle to research in the health sciences has been the lack of adequate criterion measures. The problem is not one of disagreement as to what the criterion should be, because most authorities recognize that patient welfare is the most relevant criterion for evaluating changes in medical and nursing practice. However, patient welfare has been difficult to define and measure, and, therefore, few investigators have employed it as the criterion.

This article describes four rating scales which were developed to measure different aspects of patient welfare. These rating scales were used as criterion measures in a series of experiments concerned with the relation between nursing activity and patient welfare.* Three major steps were involved in developing these rating scales. The first step was to identify the major aspects, or dimensions, of patient welfare. The second step was to develop formal instruments to measure these different aspects of patient welfare. The third step was to evaluate the instruments which were developed in terms of their reliability, their sensitivity, their ease of use, and their relations to each other, as well as to other indicants of the patient's condition.

IDENTIFYING THE DIMENSIONS OF PATIENT WELFARE

What is patient welfare? Essentially, this is the question which was posed to a group of medical and nursing authorities. This group consisted of physicians who were specialists in internal medicine, surgery, and urology and nurses who were engaged in teaching and administration. These authorities were asked to identify those physical and behavioral characteristics which reflected a patient's welfare. The characteristics of patient welfare which the authorities suggested were evaluated in terms of the following criteria:

1. Did the authorities agree as to whether the characteristic was relevant to patient welfare?
2. Could reliable measurements be made of the characteristic?
3. Would data be readily obtainable?
4. Would the data collected be suitable for statistical treatment?
5. Would the characteristic be related to other aspects of patient welfare?
6. Might changes in nursing care affect the characteristic?

*These experiments were conducted at University Hospitals, State University of Iowa. The study was supported by Research Grant GN-4786; National Institutes of Health; U.S. Public Health Service, and by the State University of Iowa. Principal Investigators were Myrtle E. Kitchell Aydelotte and Marie E. Tener. Project Director was Wellborn R. Hudson. The author was Associate Project Director. Nurse members of the research staff were: Sally Chastain, Jeanette Hoffman, Pearl Johnson, Jane Kroetsch, Marian Olson, June Rekward, Elizabeth Sprague, Frances Walker and Dolores Whitehead.

Among the physical and behavioral characteristics which were selected using the above criteria were the following: Mental Attitude, Mobility, Physical Independence, and Skin Condition. The following sections describe the rating scales which were developed to measure these four dimensions of patient welfare.

CONSTRUCTING FORMAL RATING SCALES

The general procedure followed in constructing the rating scales involved (1) having a development committee prepare descriptive statements which represented different degrees of the characteristic to be measured, (2) having an expert jury of nurses rank order these statements from 'poor' to 'good', (3) assigning to each statement a numerical weight based on the jury's rankings, and (4) conducting preliminary trials during which nurses used the rating scales to describe the behavior or condition of their patients. The construction of each of the four rating scales will be described in more detail in the following sections.

Mental Attitude

Medical and nursing authorities agree that mental attitude, though difficult to define and measure objectively, is an important aspect of patient welfare. As used in this article, mental attitude refers to a patient's observable verbal and emotional responses to his environment and to his treatment. The Mental Attitude scale (see Figure 1) consists of 17 words and phrases. By placing checks in the appropriate column, the nurse indicates whether or not each word or phrase is characteristic of a patient's behavior during a given day. The patient's total Mental Attitude score (which may range from 40 to 65) is obtained by adding the numerical weights which correspond to the descriptions which have been checked. Five of the 17 descriptions have a weight of 5, four have a weight of 4, five have a weight of 2, and three have a weight of 1. When a description is marked as not characteristic of a patient, a neutral weight of 3 is assigned.

The first step in constructing the Mental Attitude scale was to select 50 words and phrases which described a patient's mental attitude. These descriptions were typed one to a card and submitted to a jury of 29 registered nurses. The jury members were given the following instructions:

"Patients on the ward behave in many ways which are frequently described as reflecting their mental attitude. We are selecting words and phrases which describe degrees of mental attitude. We would like you to read through the 50 cards and then select the 10 which you feel represent the best mental attitude and the 10 which represent the poorest attitude. Then pick the 10 cards showing next best attitude, and then 10 showing next worst attitude. You will end up with five piles of 10 cards each, ranging from best to worst attitude."

A tabulation of the jurors' sortings indicated that on 27 of the 50 words or phrases there was general agreement among the jurors as to the location of the description along the mental attitude continuum; *i.e.*, over half of the jury placed the item at the same point along the five point scale. Each

of these 27 items was assigned a numerical weight from 5 (best mental attitude) to 1 (worst mental attitude), depending on the scale point which the majority of jurors assigned to the item. Because there was little agreement on the remaining 23 items, they were eliminated from further consideration.

The next step was to use the 27 item scale to collect a pair of ratings on each of 140 patients. Each patient was rated independently by two different nurses who had observed his behavior on that day. The nurses indicated whether each word and phrase was characteristic or not characteristic of each patient they observed. The purpose of this preliminary trial was (1) to determine for each item whether it would be used by the ward staff to describe a patient's behavior, and (2) to determine whether independent raters would agree on the description assigned a patient.

From the data obtained, a discrimination index and a reliability index were computed for each of the 27 items.* The discrimination index indicated whether or not an item differentiated between patients. For maximum discrimination an item should be used about half of the time in characterizing a group of patients. The reliability index for an item indicated the extent to which independent raters agreed on the use of the item to describe a patient. The discrimination index and the reliability index were used to select 17 'best' items for inclusion in the final scale. Items that did not contribute to discrimination between patients and items that raters could not agree on were eliminated.

The next step was to estimate the reliability of this 17 item scale. The pairs of rating forms for each of the 140 patients were therefore rescored using only the 17 items. The between-rater agreement (r_1) was .70 and the split half reliability (corrected by the Spearman-Brown Formula) was .95. These estimates of reliability were biased, however, since they were based on the same cases used to select the scale items. An unbiased estimate of between-rater agreement appears in Table 1.

At the same time that the 140 pairs of ratings were being collected, each rater was also asked to rank order, on the basis of 'overall mental attitude' all of the patients to whom she had assigned ratings. Each patient's overall mental attitude ranking was compared with his rank as determined by his score on the Mental Attitude scale. Rank order correlations ranged from .55 to .85 with .80 being a typical value. This correlation suggests that the Mental Attitude scale does, in fact, measure what nurses have in mind when they refer to 'mental attitude'.

Mobility

Because a patient's mobility status is closely related to his physical condition and to his will to get well, mobility is one of the indicators often used to evaluate a patient's progress. As used here, mobility refers to the

*The discrimination index $\delta = 4PQ$ where P = per cent of times the description is checked as characteristic of the patient and $Q = 100\% - P$. The reliability index where e is the percent of times that independent raters disagree on their judgments. $\phi = \frac{PQ - e/2}{PQ}$

degree to which a patient has resumed the normal physical activities of sitting, standing and walking.

Nineteen statements describing degrees of mobility were rank ordered by a jury of 20 nurses. A total value was computed for each statement by summing the rankings the jurors assigned to each statement. A numerical weight (from 1 to 16) was then assigned to each statement according to the total value of each statement. The total value of three of the statements was essentially the same as the value of three other statements; therefore, these statements were assigned the same weight. Figure 2 shows the 19 statements with the weights which were assigned to each. The nurse in charge of each shift simply checked the statement describing each patient's mobility attainment during that shift.

Physical Independence

The Physical Independence scale reflects the belief of medical and nursing authorities that: (1) a patient's dependence upon others is an important aspect of his welfare, and (2) the process of regaining physical independence might be hastened by increasing the amount and quality of nursing care. The Physical Independence scale (see Fig. 3) consists of three groups of statements describing degrees to which the patient is dependent upon the nurse for his physical care. The nurse rates her patient by checking the appropriate descriptive statement under each of the three sections: Bathing, Nutrition, and Elimination. The different degrees of dependence in these three areas are each assigned numerical weights from 1 to 6 which reflect the ranking assigned to the statements by a jury of nurses. A patient's Physical Independence score is the sum of the weights of the three statements checked, and it can range from a low of 3 to a high of 18.

Skin Condition

A patient's skin condition, aside from being a generally accepted indicant of his wellbeing, is thought to be especially sensitive to the amount and quality of nursing care which he receives. The Skin Condition scale (see Fig. 4) consists of two parts. Part I is a list of statements describing various types of skin lesions. These statements were assigned numerical weights from 8 to 0 according to the way a jury of expert nurses ranked the seriousness of the lesions described. Part II of the measure consists of five statements which describe different numbers and sizes of lesions. These statements were assigned weights from 0 to 4. The standard for distinguishing small, medium, and large-sized lesions was provided by printing three circles with diameters of $\frac{3}{4}$ in., 1 in., and $1\frac{1}{4}$ in. on the rating sheet. Part II of the measure also lists four body areas. For each body area the nurse chooses the statement from Part I which best describes the skin condition of the area and then places the numerical value of this statement beside the statement in Part II which describes the size of the lesion. A score for each body area is obtained by adding the value of the appropriate descriptive statement to the weight of the statement describing the size of the lesion. The scores for each body area are added to obtain the patient's total Skin Condition score.

The following example will illustrate the scoring method. A patient has a large raw area in the gluteal folds from severe diarrhea, two small bruises on his left forearm from intravenous injections, and a light dry rash on one leg, cause unknown. The raw area in the gluteal folds is described by the statement in Part I as having a weight of (4). Therefore, the value of 4 would be recorded opposite the statement with a weight of (1) which describes the size of the lesion and in the column for the first body area, Back, Shoulders, and Hips. The score for the body area is computed by adding the weights of the two statements ($4 + 1 = 5$). The score for the second body area, Arms and Hands, is 8, computed by adding 6 (bruises) and 2 (two small areas). The light rash results in a score of 11 ($7 + 4 = 11$) for the third body area, Legs and Feet. Because the fourth body area is essentially normal, the score is 12 ($8 + 4$). The total Skin Condition score is the sum of the four area scores ($5 + 8 + 11 + 12 = 36$).

EVALUATING THE MEASURES

The usefulness of these rating scales as criterion measures in the health sciences depends upon their reliability, sensitivity, and ease of use, as well as upon their relations to each other and to other indices of the patient's condition.

Reliability

Periodic tests were made to determine the between-rater agreement for each of the patient welfare measures. Reliability of the measures was estimated using r_1 , the intraclass correlation coefficient (Ebel, 1951). The correlations reported in Table 1 are conservative estimates of the reliability of the measures since the between-raters' variance was not removed from the error term. The average reliability of each measure was computed by using the r to z transform and weighting each sample in terms of the degrees of freedom (Guilford, 1956).

Sensitivity

Sensitivity is an essential property of any measuring instrument. The sensitivity of the nurses' rating scales refers to the ability of the measures: (1) to detect differences in welfare between patients, and (2) to detect changes in a patient's welfare during his hospital stay. To build a completely conclusive case for the sensitivity of the nurses' rating scales would require the comparison of each scale with a generally accepted standard instrument of known sensitivity. Unfortunately, no such standard exists. Therefore the following evidence for the sensitivity of the rating scales is necessarily indirect.

Measures detect differences between individual patients. The fact that the measures are reliable can be interpreted as evidence of their sensitivity. The reliability studies summarized in Table 1 indicate relatively good agreement between independent raters on the ratings which they assigned to large, unselected groups of patients. This means that the measures were sensitive enough to enable raters to make consistent discriminations between individual patients.

Measures detect differences between groups of patients. Additional evi-

dence for sensitivity is provided by the fact that the measures detected significant differences between groups of patients who were assigned to different levels on the basis of their age and a physician's evaluation of their general condition. These differences between levels would be predicted on the basis of the significant correlations between each of the nurses' rating scales and the physician's evaluation of general condition (see Table 3).

Measures detect changes in groups of patients during their hospital stay. Another way of demonstrating the sensitivity of the nurses' rating scales is to show that they detect changes in a group of patients during their stay in the hospital. It was assumed that the welfare of most patients improves over the course of their hospital stay. If this assumption is correct, and if the rating scales are sensitive to change, then there should be a difference between the mean patient welfare score based on the first half of a group's hospital stay and the mean score based on the second half of their stay.

The patient welfare scores of six independent groups of patients were analyzed. The total hospital stay of each patient was divided in half, and a mean score was computed for each half. From these scores, means for the first and second half of a group's stay were computed. These means were compared using the *t* test for related measures.

Table 2 summarizes the results of these tests. Each measure detected a significant difference between the first and the second half means in at least one of the groups tested. Differences tended to occur more frequently with groups of medical patients than with groups of urological patients. This is probably because most urological patients had operations during their hospital stay. For some time following surgery, a patient's Mobility and Physical Independence ratings are usually lower than his ratings before surgery. If in a given group of patients there were several for whom the second half of their stay was post-operative, we would no longer expect that the group mean for the second half of the hospital stay would be higher than the group mean for the first half.

The fact that differences between the first and the second half means were not always significant might be caused by factors other than the presence of post-operative patients in the group. For example, according to the physician's evaluation, the general condition of over half of the patients did not change from admission to discharge and, indeed, the condition of a few patients worsened. Therefore, it may be that, on the average, certain groups of patients did not improve over the course of their hospital stay.

To summarize, then, all of the nurses' rating scales, for at least some groups of patients, detected differences between the first and second half of the patients' stay. This indicates that the measures are sensitive to change. The fact that for many groups the measures indicated no change in the condition of the group is not necessarily damaging to the sensitivity argument. It is probable that, in these groups, either the patients did not change or the improvement of some patients in the group was cancelled out by the increasing illness of others.

Distribution of Scores

The sensitivity of a rating scale is a function of the range of scores obtained as well as the shape of the distribution. Obviously a scale consisting of a very limited number of steps does not permit fine differentiation between patients. Similarly, any extreme bunching of scores at one or two points along the scale tends to restrict the sensitivity of the measure.

Figures 5, 6, 7 and 8 show the distribution of ratings obtained on the four nurses' rating scales.* The top graph in each figure is based on ratings collected on the Medical Service while the bottom graph is based on ratings collected on the Urological Service. The shapes of the distributions from these two services are very similar. The distribution of Mental Attitude ratings (Fig. 5) is characterized by a marked negative skew; *i.e.*, most of the ratings assigned are at the high end of the scale. Also, the effective length of the scale is considerably less than the possible range of 25 points. The distribution of Mobility ratings (Fig. 6) tends to be U-shaped; *i.e.* patients tended to be either confined to bed or up *ad lib*. The 32 point range of the Mobility scale results from adding ratings for the 7-3 and the 3-11 shift. Ratings on the Physical Independence scale (Fig. 7) are distributed over a 16 point range, and, like the Mental Attitude ratings, they tend to fall at the high end of the scale. The Skin Condition ratings (Fig. 8) are fairly evenly distributed among the 15 top scale points. Ratings below about 30 are very infrequent.

Ease of Use

An important characteristic of a good criterion measure is its ease of use; *i.e.*, the judgment called for should be as simple as possible and should make minimum demands on the rater's time. Considerable care was taken when constructing each rating scale to employ short simple descriptions which the rater could easily match to the patient's behavior or condition. Experience with the Mobility scale, for example, indicated that the nurse in charge of a ward could rate 25 to 30 patients in a few minutes. The Mental Attitude and Physical Independence ratings were also so straightforward that student nurses and subsidiary personnel as well as graduate nurses made reliable ratings after only a brief orientation to the scales. The Skin Condition ratings, however, had to be made by specially trained expert nurses rather than by regular members of the ward staff. The low reliability of Skin Condition ratings made by regular staff nurses appeared to be due to the inherent complexity of the judgments required rather than to any shortcoming of the rating scale itself.

Intercorrelations

Table 3 shows the intercorrelations between the four rating scales. Table 3 also shows the relations between these scales and two other indices: the patient's age and a physician's evaluation of his general condition. Age is an objective index which might be expected to correlate with measures

*Note that the graphs represent the relative frequency of ratings at the various steps along each scale and not the distribution of patient scores (which were computed by averaging all ratings assigned to a patient).

of patient welfare. The physician's rating, on the other hand, is the most widely accepted criterion of patient welfare. The top correlation in each cell is based on scores of 154 female medical patients, whereas the bottom correlation in each cell is based on scores of 96 male urological patients. A patient's score on each of the four nurses' rating scales was the average of the ratings assigned during his hospital stay. Patients were rated daily on the Mental Attitude, Mobility, and Physical Independence scales, whereas Skin Condition ratings were made every other day. Only patients who were hospitalized for a minimum of four days were included when computing the intercorrelations.

The General Condition rating was made by the resident physician soon after the patient was admitted to the hospital. The following rating scale (weights shown in parentheses) was used: very good (6), good (5), fair (3), (poor 2), moribund (1). The weights assigned to the descriptions reflect the judgment of the physicians that the step between fair and good general condition is larger than the other steps along the scale.

Table 3 shows that there is a significant positive correlation between all four of the nurses' rating scales. Table 3 also indicates that there is a significant relationship between each of these scales and the physician's evaluation of the patient's general condition. These intercorrelations suggest that the nurses' rating scales are measuring different yet related aspects of patient welfare. The correlation between age and the other measures is significant for the sample of medical patients but is not significant for the urological patients. This result may be related to the more advanced age of the urological patients (mean age of 66.6 *vs* 58.6 for the medical patients).

DISCUSSION AND SUMMARY

This article describes four rating scales which were used as criteria in a series of nursing research studies. The scales measure the following aspects of patient welfare: Mental Attitude, Mobility, Physical Independence, and Skin Condition. The development and use of these scales are discussed, and data are presented concerning their reliability and sensitivity. Each scale correlates significantly with the most widely accepted criterion of patient welfare, a physician's evaluation of the patient's general condition. Intercorrelations between the four rating scales suggest that they measure different yet related aspects of patient welfare. Data are interpreted to indicate that nurses' ratings of patient welfare can provide reliable, sensitive, and easy-to-use criteria for appraising the effect on the patient of various types of medical or nursing care.

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FIG. 5

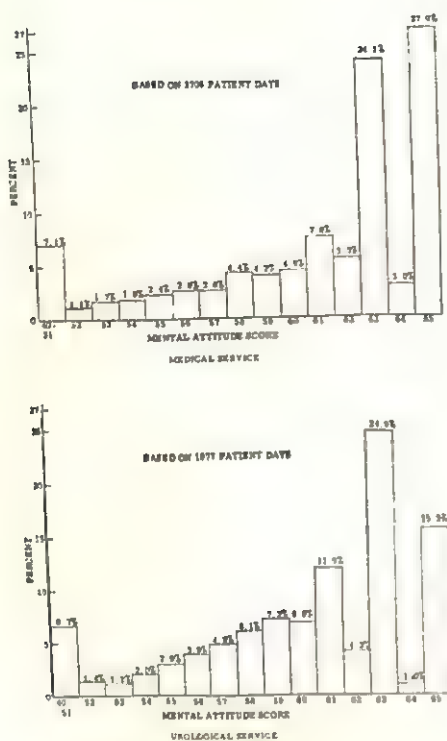


FIG. 6

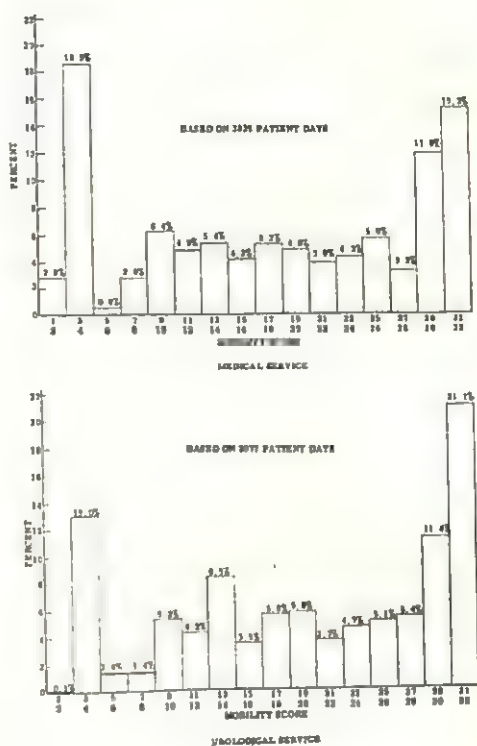


FIG. 5: DISTRIBUTION OF RATINGS ON THE MENTAL ATTITUDE SCALE

FIG. 6: DISTRIBUTION OF RATINGS ON THE MOBILITY SCALE

FIG. 7

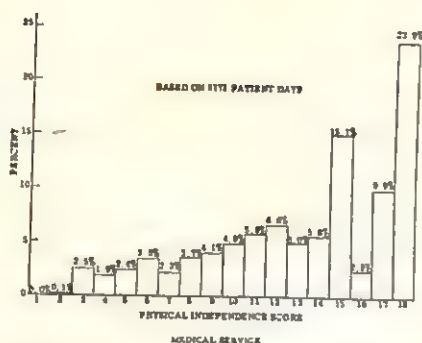


FIG. 8

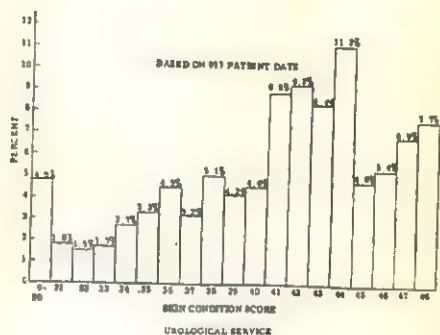
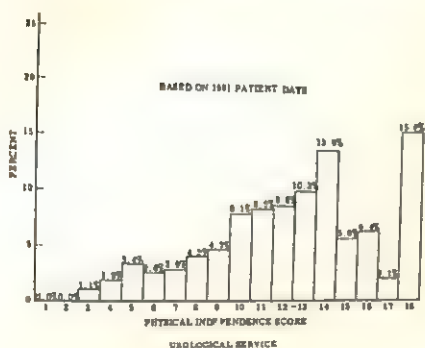
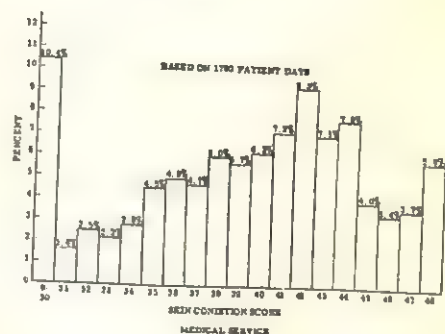


FIG. 7: DISTRIBUTION OF RATINGS ON THE PHYSICAL INDEPENDENCE SCALE

FIG. 8: DISTRIBUTION OF RATINGS ON THE SKIN CONDITION SCALE

TABLE 1: BETWEEN-RATER AGREEMENT FOR THE PATIENT WELFARE MEASURES RELIABILITY ESTIMATED USING THE INTRACLAS CORRELATION COEFFICIENT (r_1)

MEASURE	NUMBER OF PAIRS	r_1
Mental Attitude	85	.73
Mobility	113	.87
Physical Independence ..	114	.86
Skin Condition	58	.74

TABLE 2: COMPARISON OF MEAN PATIENT WELFARE SCORES FOR THE FIRST AND SECOND HALF OF PATIENTS' HOSPITAL STAY

MEASURE	GROUP α	FIRST HALF MEAN	SECOND HALF MEAN	t
Mental Attitude	Medicine I	61.49	61.50	0.02
	Medicine II	61.54	62.77	2.43*
	Medicine III	59.90	60.71	1.45
	Medicine IV	60.25	60.38	0.18
	Urology I	60.40	60.53	0.32
	Urology II	60.13	60.17	0.18
Mobility	Medicine I	18.83	23.24	5.39**
	Medicine II	15.57	20.47	5.03**
	Medicine III	15.61	19.26	4.04**
	Medicine IV	19.24	21.68	3.68**
	Urology I	18.94	21.96	2.88**
	Urology II	20.89	21.21	0.40
Physical Independence	Medicine I	14.38	14.87	2.36*
	Medicine II	14.00	14.93	3.52**
	Medicine III	13.51	14.63	4.09**
	Medicine IV	13.83	14.09	1.10
	Urology I	12.39	13.33	2.26*
	Urology II	13.07	12.76	1.26
Skin Condition	Medicine I	39.08	40.11	1.50
	Medicine II	39.72	38.65	1.55
	Medicine III	40.93	39.34	2.80**
	Medicine IV	40.65	40.28	0.64
	Urology I	41.88	41.71	0.27
	Urology II	41.61	41.40	0.51

α The Ns for the six groups in the order in which they are listed are 44, 35, 38, 37, 49 and 47.

* Significant at .05 level.

** Significant at .01 level.

TABLE 3: PRODUCT MOMENT CORRELATIONS BETWEEN MEASURES OF PATIENT WELFARE^a

	AGE	MENTAL ATTITUDE	MOBILITY	PHYSICAL INDEPENDENCE	SKIN CONDITION
Mental Attitude ..	-.37* .03				
Mobility	-.34* .19	.56* .48*			
Physical Independence	-.34* .04	.74* .66*	.87* .78*		
Skin Condition .. .	-.21* .12	.40* .58*	.46* .55*	.48* .70*	
Physician's Evaluation of General Condition ..	-.29* .01	.42* .32*	.50* .45*	.54* .49*	.36* .50*

^a The top figure in each cell is based on 154 female medical patients. The bottom figure in each cell is based on 96 male urological patients.

* Significant at .01 level.

FIG. 1: MENTAL ATTITUDE RATING SCALE
(Numerical weights shown in parentheses did not appear on rating scale)

Patient.....Date.....Ward.....

DESCRIPTION OF PATIENT	CHARACTERISTIC	NOT CHARACTERISTIC
Friendly	(4)	(3)
Considerate	(4)	(3)
Interested in appearance ..	(5)	(3)
Understanding	(5)	(3)
Irritable	(2)	(3)
Quarrelsome	(1)	(3)
Fussy	(2)	(3)
Despondent	(1)	(3)
Helpful to patients ..	(5)	(3)
Co-operative	(5)	(3)
Apathetic	(1)	(3)
Appreciative	(4)	(3)
Demanding	(2)	(3)
Agreeable	(4)	(3)
Cheerful	(5)	(3)
Worrying	(2)	(3)
Impatient	(2)	(3)

.....
Rater

FIG. 2: MOBILITY RATING SCALE
(Numerical weights shown in parentheses did not appear on rating scale)

Ward..... Date.....

Absolute bedrest	(1)
Bedrest	(2)
Dangled 1 or 2 times with help ..	(3)
Dangled 3 or more times with help ..	(4)
Lifted into chair 1 or 2 times.. ..	(5)
Dangled 1 or 2 times without help ..	(5)
Lifted into chair 3 or more times ..	(6)
Dangled 3 or more times without help	(6)
Assisted to chair 1 or 2 times	(7)
Assisted to chair 3 or more times ..	(8)
Up in chair without help 1 or 2 times	(9)
Ambulated with help 1 or 2 times ..	(10)
Up in chair 3 or more times without help	(10)
Bedrest with BR or patients up to BR only	(11)
Ambulated with help 3 or more times ..	(12)
Ambulated without help 1 or 2 times ..	(13)
Ambulated without help 3 or more times	(14)
Up ad lib part of the day	(15)
Up ad lib most of the day	(16)

FIG. 3: PHYSICAL INDEPENDENCE RATING SCALE
(Numerical weights shown in parentheses did not appear on rating scale)

Patient..... Date..... Ward.....

I. BATHING

(6) Bathes without help in bathroom

(5) Bathes without help in bed or at bedside

(4) Bathes with help in bathroom

(3) Partial bath in bed or at bedside by self

(2) Bathes only face and/or hands

(1) Needs complete bed bath

II. NUTRITION (If NPO for test or pre-op, check category patient would be in if he was not NPO)

(6) Feeds self

(5) Needs help with positioning of tray

(4) Needs help with preparation of food

(3) Needs to be partially fed

(2) Needs to be fed

(1) Unable to eat or refuses to eat

III. ELIMINATION

(6) To bathroom without help

(5) To bathroom with help

(4) Uses bedpan or urinal in bed or chair without help

(3) Uses bedpan or urinal in bed or chair with help

(2) Incontinent of urine or feces—includes catheter or colostomy

(1) Incontinent of both urine and feces—includes catheter and/or colostomy

..... Rater

FIG. 4: SKIN CONDITION RATING SCALE
(Numerical weights shown in parentheses did not appear on rating scale)

Patient..... Date..... Ward.....

PART I

Color and continuity of skin normal; or pink to blue discoloration which disappears with massage or periodic relief of pressure, such as; turning, sponge rubber pad, or donuts. Dry scaly skin or mild rashes that have not broken or sloughed. (8)

All bruised or hardened areas resulting from shots or other causes excluding inflammatory processes and pressure, or reddened to broken areas on elbows only as a result of causes other than pressure (i.e., sheet burns). Pink to blue discoloration which does not disappear with massage or periodic relief of pressure and more severe rashes that are reddened but not sloughing. (7)

Skin surface blistered or broken with no subcutaneous or muscle tissue involvement. (6)

Hardened or softened (mushy) area beneath the skin; skin surface either unbroken or blistered with red to blue discoloration resulting from pressure or inflammatory process. Skin broken; opening deep enough to involve subcutaneous tissue. (5)

Skin broken; opening deep enough to involve muscle tissue. (4)

Skin broken; opening deep enough to involve the bone. (3)

(2)

(1)

(0)

PART II	BACK, SHOULDERS, AND HIPS	ARMS AND HANDS	LEGS AND FEET	CHEST, ABDOMEN, HEAD AND NECK
NUMBER AND SIZE OF LESIONS				
Normal skin, dry scaly skin, and unbroken rashes (4)				
One small area a (3)				
Two or more small areas or one medium area b (2)				
Two or more medium areas or one large area c (1)				
Two or more large areas or its equivalent in a single area (0)				

Total Skin Condition Score

a, b, c: Three circles, diameters $\frac{1}{2}$, 1 and $1\frac{1}{2}$ inches, were printed on the form to guide the rater in judging small, medium and large lesions.

Psychopathology and Occupation

Part 1, Economic Insecurity*

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I: INTRODUCTION

COMMON SENSE and popular observation have often tended to attribute emotional disturbance to economic hardships or domestic troubles of one kind or another. The layman is perplexed when an individual whose home life is considered exemplary and who has undergone no economic hardship is said to have had a nervous breakdown. The common idea behind this originates in the nearly universal experience of "worry" about money—or about illness or discord in the family. Since worry is disturbing and has such evident causes, the belief is easily derived that a great deal of worry over some real disorder in the affairs of the individual must be the "cause" of his breakdown. Parallel to this is the popular disposition to consider various character traits as derived from persistently unfavourable economic conditions. Thus miserliness is often ascribed to persistent hardship in early life, or an individual's selfishness to the excessive lavishness of his wealthy parents.

The life histories of patients have provided us with extensive data which tend to alter the picture. When studied retrospectively, the course of individual development reveals experiences which anticipate the illness. Furthermore such longitudinal case histories reveal that *many determinants* exist rather than single causes. This is true not only of acute neuroses but also of the character disorders.

Generally, when the psychiatrist ventures into studying the economic and social lives of his patients it is in order to increase his understanding of their illness. Emotional illness is all-pervasive in the lives of those who suffer it. Economic activity of one kind or another is universal. Everyone in the society, whether or not he is directly engaged in getting a living, has been subjected to economic influences. As a child he experiences the economic life of his family, including sometimes deprivation and neglect. Adults engage in the economic activities of acquisition and consumption, in the effort to maintain a secure economic status and in competition with others.

The psychiatrist is prompted to inquire how economic activities and emotional condition may have interacted or be interacting in anyone who comes to him for help. The question may be looked at from two aspects: How do the activities and changes of economic life affect the development

*The preparation of this paper by S. A. Leavy, M.D., and L. Z. Freedman, M.D., was aided by the Foundations Fund for Research in Psychiatry. Part 2, Work and Competition, will appear in the July, 1961, issue of *Occupational Psychology*.

of emotional illness or health, and how do emotional illness or health affect economic life? It is through the focusing lens of illness that all the psychiatrist's observations on these questions must be made. Illness is what brings his patients to him, and illness is what he is trained to treat. Through the study of illness he may be able to make observations which are applicable outside the range of the pathological.

The illnesses and maladjustments of the emotional life from which people suffer have in recent years been studied from many points of view. Of these approaches the most instructive, and the one which has revolutionized the entire field, has been the investigation of the origins and development of these disturbances during the early years of life. This psycho-analytical investigation, which has invigorated the study of emotional disturbances, has been principally concerned with the emotional relationships in childhood with the principal persons of the family.

Apart from constitutional factors, early identifications, fantasies, disappointments, deprivations and indulgences, and the protective mechanisms developed in response to them, have come to be recognized as the primary forces which determine the tendencies that may lead to later illness. The experiences of the expanding environment of the child, and all the experiences of the life of the adult, including economic experiences, are of importance in that they adhere to, complicate, and sometimes enormously modify the tendencies earlier determined. Yet even these later experiences are construed with reference to the interactions of the individual with new human figures upon whom are projected the mental residues of early family life.

It seems a long leap from this study of the buried past of the individual to an attempt to understand what part in the formation of his emotional disturbances is played by the conduct of his economic life. Our special interest in the lives of our patients within their families has sometimes deterred us from investigating the external environment in which their economic life is largely engaged. The unhealthy tendencies which culminate in psychoneurosis are often isolated conceptually from the specific social and cultural contexts in which they actually occur. Psychiatrists see these tendencies at work in patients of all social classes and at all economic levels, however different the situations of individual patients may be.

Emotional illness can thus be understood in proportion to the thoroughness with which the individual's life is known. Disturbing events of his present life may cause emotional illness when there is a predisposition which derives from earlier events in his life. Some situations of stress may be beyond the mastery of anyone. In the face of some disturbing events the individual is not psychically prepared to operate efficiently, at his most mature level, and must therefore grapple with these experiences with inadequate instruments. He is forced to retreat to attitudes which were more appropriate in dealing with the less complex situations of an earlier period of his life. This retreat, or regression, revives in the individual the residues of painful experiences of the past. The less appropriate his means of handling the new situations, the more menacing the situation becomes. What

are some of the determinants of this phenomenon?

We do not know with certainty what influences of early childhood are specifically likely to lead to later emotional illness,* but we do know that these are connected with the relative weakness of the organization of the personality in childhood. Elementary instinctive drives seeking discharge are not subjected to the controls appropriate to the mature person; unfavourable environmental circumstances, unduly repressive or unduly stimulating, distort the development of these controls. A child of at least average intensity of aggressive drive is, for example, subjected to bodily punishment whenever the drive is manifested. Another is denied adequate attention and affection. A third is overly protected or overly indulged so that there is not sufficient training in withstanding temporary frustrations. The preservation of security and the limitation of anxiety, in such situations of emotional danger, determine the formation of inner trends which are the forerunners of obsessions, compulsions, hysterical reactions, and other symptoms of neurosis, as well as the inflexible character patterns that are recognizable as abnormal and yet are not distinguished by neurotic symptoms.

Most of these adverse circumstances of childhood take place within the little society of the family. The world outside is known primarily through the medium of the family. It is especially of importance to us that *via* the family are also transmitted the social values that are integrated into the life of the individual child as part of one of the elementary systems of his personality—the system of sanctions and restrictions known as the superego. Economic attitudes are among the values taken in by the developing child, and these attitudes as well as the adaptive capacities in general are subjected to such influences as, for example, the impact of the experience of poverty.

The means whereby the values of the society become part of the individual were studied by Durkheim (1) who attempted to account for the apparent conflict between individual desires and social restrictions, and how it was resolved. He came to the conclusion that the restrictions were themselves internalized and became part of the individual. In his study of suicide he showed how an important element in this form of aberrant behaviour was the inner confusion created by the discrepancy between what the society offered the individual as expectation and what it permitted him to attain. What the society expects of the individual and what it enjoins upon him to expect to attain are value judgements which, as Freud formulated the question psychologically, become part of his mental structure in the course

*Throughout this study all references to emotional illness are to be defined as *psycho-neurosis*, unless the term *psychosis* or one of its diagnostic varieties, e.g., *schizophrenia*, is named. Absolute distinctions between psychosis and psychoneurosis (more simply *neurosis*) are difficult to make. Psychoneurosis or neurosis generally indicates those emotional illnesses in which the patient's ability to discriminate between his symptoms and the external reality is not impaired as it is in psychoses. In psychoneurosis the individual's adaptation to his environment, including both his feelings and his behavior, is disturbed. This limitation to the psychoneuroses has been made in our study of the literature and of our own patients principally because of the greater similarity of "normal" and neurotic experience. In addition we are safest at present in attributing primarily environmental causes to the psychoneuroses. There is less evidence in them than in the psychoses that constitutional and organic causes are important. This does not imply that the relationships between psychosis and economic life are different from those existing between psychoneurosis and economic life—a question which is unanswered.

of his development. They have therefore the feeling of transcendence which adheres to value judgments, having become fused early in the learning process with the parental authority that is represented within the self as the superego. In less theoretical language, we know at how early an age the growing child in our culture has to learn the obligatory nature of productive effort, and how this is added to the earlier obligations he has learned in his relationships with his parents.

The family may also itself be modified by changes in its economic situation, and thereby disturb the balance of the early environment. This may occur directly, through actual poverty, or indirectly, through the disturbance to family relations which economic changes tend to provoke. Scattered through our case histories were many examples of these disturbances. Sometimes actually there had been some deprivation of economic necessities in childhood; more often there was crowding of living conditions, a deprivation of the attention of parents because of the protracted working hours, functional loss of the mother from the home when she had to work. These patients had not experienced normal family life as it is conventionally pictured, and in their cases poverty was responsible.

When we turn now to the life of the adult, after this summary recapitulation of his development, we see how his early experiences may have prepared him to be sensitive to the fluctuations of economic life. The ability of any individual to master situations is limited. Persons with specific limitations growing out of their early life are endangered by relatively minor stresses. Inability to master the situation, not to feel one's self to be in command of one's fate, not to be able to control it by forming some acceptable mental image of what is to come, is likely to arouse a feeling of anxiety or depression and, yet more significantly, to cause maladaptive behavior. The individual failing to cope with his problem at the highest state of his maturity attempts to deal with it with more primitive devices. The regression in turn may be the source of further symptomatic experiences.

Such behaviour might be, for example, the return of a hitherto independent person to the home of his parents. Economic depression and unemployment precipitated such experiences in the lives of many people, resulting both in the loss of their independent arrangements for living and in the crowding of sometimes uncongenial relatives. We must distinguish in such cases between a regressive return of this kind and one which is primarily prompted by necessity—a discrimination at times hard to make. A situation may provoke such a return in a person who would ultimately be able to master it, who is not overcome emotionally but is making a strategic retreat. Another person may return to the parental home because he feels unable to deal with what has happened to him. He needs something of the same kind of emotional support that he needed in childhood, and looks for it from his parents, probably without full awareness of what he is doing. Once gratified in this need, however, he is reduced to an infantile status that is not acceptable, and he may become sick. This is only one example of how a situation in external life may precipitate neurotic experience and behaviour.

We may ask, to restate our problem, whether experiences related to getting a living have a determinative effect in the appearance of neurotic symptoms. We may also ask whether neurotic people show their neurotic symptoms in specific ways in their economic life. These primary questions lie behind the study which follows. They are pursued in greater detail with regard to various subdivisions of what we have defined as economic life, and particularly into the problems of competition and prestige, of insecurity and of work—all in relation to their causal significance in neurosis and of their functions as theaters for the enacting of neurotic behaviour.

II: METHOD OF STUDY

Our clinical material consisted in the first place of five hundred case records of psychoneurotic patients. All of these patients had been treated during the period between 1946 and 1951. We consider these dates of some importance in that they include a period of high employment and relative prosperity following the close of World War II and including the years of mounting war production that followed. All but a few of the patients came from the city of New Haven or the surrounding area. They can be considered representative, at least of this section of eastern United States, although no doubt some of the sociological generalizations made about them are referable to a larger area. They also include a wide scope of vocations—factory workers, managerial employees of various levels, administrators, and professional workers, as well as housewives. Their background was almost exclusively urban.

Approximately half of these patients were hospitalized for periods of varying lengths in the Yale Psychiatric Clinic; the other half were seen as outpatients of the Psychiatric Dispensary of the Grace-New Haven Community Hospital. Their case records, selected successively, omitting all psychotic and organically ill patients, were abstracted with regard to relevant economic factors. To do this a preliminary screening questionnaire was devised to sift out of the case records whatever data might be related to economic life. The screening questionnaire included about two hundred questions and was therefore sufficiently comprehensive to expose a few positive findings in almost all of the case records. We did not find this kind of economic reference appropriate to statistical quantification. Qualitative evidence derived from individual histories, however, was at hand indicating the force of economic circumstances as causal influences in the neuroses of specific patients, as our illustrations will demonstrate.

The material of the case record is in certain ways an equivocal source of factual information. Inherent distortions may derive from the biases of the psychiatrists who wrote the records. The case records were written by psychiatric residents who had a common orientation but displayed individual interests. There was no evidence, however, that any had significantly overemphasized social and economic data. These psychiatrists, to be sure, accepted certain culturally given norms of healthy and unhealthy activity, including economic activity. There was no way to check for the opposite errors of omission. Psychiatrists interested in the formulation of their patients' problems in terms of emotional tensions arising within the family

may at times have neglected to elicit or to report data of economic interest.

The histories must also vary greatly in validity, since they varied in length, from one or two interviews to large volumes of interviews. The most valuable from our point of view generally were the latter, since we could assume them to be more thorough reports of what had actually happened to the patients.

When abstracts of economic data were made from the original charts, we undertook early in our study a check on our own reliability by making comparisons of the findings we obtained separately. These abstracts were themselves reviewed and classified in three groups according to the apparent significance of the economic data ascertained. Some of the histories lacked any reference to economic factors; ten per cent gave on initial inspection the promise of highly significant associations between the neuroses and the economic experience of the patients; the large majority contained only sporadic references to economic matters, some of which were nevertheless of considerable interest to us and are referred to in pertinent parts of our discussion below. The "positive" ten per cent were subjected to the most thorough scrutiny of all, the case histories being perused in detail by us, in order to realize within the total context of the case history the responses of the individual patients to economic life.

As a further source of empirical data and also as a criterion of what we might consider significant in the clinic case records, we had access to the records of our private cases. These, since they were directly observed, did not present the limitation of the other records.*

We had equal samples of hospitalized and clinic patients in our five hundred case histories. The most striking differentiation between these two groups of patients is the economic one. The clinic patients are a selected group, excluding all those who would be able to pay the customary fees for private outpatient treatment. Conversely, the patients who were treated in the hospital as inpatients, sometimes for long periods, had to be in a financial position to pay the high cost of inpatient care. Since we excluded purposely the psychotic patients from both groups, our hospitalized patients suffered illnesses of nature and severity comparable with those of the outpatients. It is true that they had to be hospitalized in some instances because of such grave symptoms as uncontrollable alcoholism, attempts at or threats of suicide, or anxiety reaching the point of panic.

III: ECONOMIC INSECURITY

The question was asked to what extent our patients' early experience of poverty, and the hazards of employment and fluctuations of income which they later experienced, may have affected their emotional lives.

Although the destructive effect of poverty in early life is readily recognizable and has been the subject of much discussion, there have been few psychological studies made of it. Plant (2) in his experience in the Essex County Juvenile Clinic observed that children in families who lived at lower

*For the purpose of assuring complete anonymity of the patients, the private cases are assimilated into the text which follows without special discrimination from the clinic cases. It should be stated also that all of the case illustrations have been disguised for the protection of the patients.

economic levels were emotionally unstable. Such emotional states were clearly affected by other conditions than the economic environment, but Plant described in detail character traits which he connected with economic situations. An interesting hypothesis of this study is the effect of crowding, because of poverty, on the formation of ideals. Under conditions of crowding, the valuable "illusions" which children ordinarily form about significant persons cannot develop or are soon dispelled. These children "know better" than to believe that any person with whom they are acquainted can be a hero to them. Only the relatively abstract heroes of sport and entertainment are not deprived of ideal qualities.

The other related problem is whether insecurity in adult life, in the form of chronic poverty and deprivation, would be a significant determinant of emotional disorders. On this a great deal has been written which we can only summarise briefly here. The principal statistical studies of the correlation between mental illness and economic factors are concerned with the effect of long-term poverty. Lemkau (3), studying an urban district in 1940, investigated the incidence of neurosis in a district of Baltimore where the average economic status was less favourable than that of the general urban population. There appeared to be a significant difference in the incidence of diagnosable neurosis among people in this urban group. That is, the incidence of neurosis was twice as great for persons on relief as for those who had an income of two thousand dollars and over. Lemkau and his colleagues said that no support was given by their findings to the widely held belief that those who were better off economically constitute the majority of the sufferers from neurosis. From their findings, on the contrary, it seemed that both psychoses and neuroses were more prevalent in the lowest social and economic class of the population.

The ecological studies of Faris and Dunham (4), which were entirely concerned with the psychoses, make correlations between the incidence of certain types of mental illness and the economic conditions of the life of the patients. Their studies are based upon the distribution of the patients' residence among parts of the city of Chicago. They noted differences in the distribution of the types of psychotic illness in the city. Schizophrenics* came from communities where the rental was considerably lower than in the communities from which manic depressives** came. Their conclusion was that social and economic factors are more significant in the schizophrenic psychosis than in the manic depressive.

The most recent and complete study of the relationship between psychiatric illness and socio-economic level was carried out at Yale University, with the participation of both psychiatrists and social scientists (5). They report a striking correlation between social level and the incidence of schizophrenia. About nine times as many patients in the lowest or "class five" level suffer from schizophrenia as would be expected if this

*Schizophrenia is defined as a mental illness characterized by a withdrawal, frequently progressive, from contact with other persons and external affairs, generally, and a pre-occupation with private fantasies sometimes culminating in delusions and hallucinations.

**In the manic depressive psychosis the most striking disorder is one of mood, which is one of elation or melancholy inappropriate to the real situation in which the patient finds himself.

illness occurred equally distributed throughout the social organization. While they were unable to demonstrate such a correlation in the wider area of the neuroses, they made the highly significant observation that almost never did this most deprived group obtain private or public psychiatric treatment for neurotic maladjustments. While these observations are not parallel to those which we have attempted to make, nevertheless these preliminary findings point toward the establishment of highly relevant connections between the incidence of economic and social factors and psychological disabilities in the more intensive studies which the Yale unit is now carrying on.

At this point we may cite as an example of the influence of long-continued poverty and insecurity the case of a young man, D., who had withdrawn from association with his friends into a life of almost total isolation because of his shame and guilt at not having a job during a period of full employment. The neurotic cause of his inability to work lay in the intense anxiety which he experienced in looking for work, when fears of being rejected and humiliated were paramount. In the background was a lifetime of economic insecurity. The most serious episode occurred during the economic depression when D. was in his early adolescence and his father was bankrupt. His father had been the least successful member of his own family and for this was derided by the boy's mother. Deeply attached as he was to his mother, he was unable to find any community of interest or understanding with his unsuccessful, disappointed father. Although there was no frank deprivation of the necessities of life, D. did not get many of the things which his friends had. Characteristically, he responded to this deprivation with the reactive attitude that they were probably not worth having anyhow, and in addition, that he, at least, was not worthy of having them. It is difficult, if not impossible, to separate the factors making for economic insecurity from those that produced the unhappy tensions of the family. We cannot find within the economic situation alone the determinants of the withdrawal from economic life that characterized this boy's neurosis. Conversely, we cannot abstract the deeper dynamic determinants of this illness from the economic insecurity in which he grew up.

Another one of our patients was a thirty-eight year old married woman, L., whose depressive ideas centred around the fear that she and her husband would be unable to maintain the situation of relative security which they had reached. She likewise felt that her children did not have the material advantages which her neighbours' children had; but particularly she feared that her husband would not be able to keep his present satisfactory job. It is interesting to correlate these symptoms with L.'s actual economic experience. Her father, of whom she had been very fond, deserted the family in her early adolescence, and the financial situation which had previously been secure became precarious. She had to leave school early because of financial difficulties, and when quite young was obliged to work in a store at night. She was married during the economic depression and for a while she and her husband were in serious financial straits. They had to live with

her mother with whom her relationship had been most unsatisfactory since her father's death. Economic requirements made them move away to a strange city, where they began to be more successful and in a few years reached financial independence. At the time of the onset of her illness, this had become imperilled once more by her husband's physical ill health. L. remembered that all during her life she had the fear of repeating the experiences of insecurity in her early childhood. The actual experience was one of virtual repetition of the early disaster. In this case the *recurring* economic insecurity of the environment in which she lived provoked the deeper insecurity in her personal life.

It is appropriate at this point to observe that *depressive patients* very often express their fears in economic terms as one sector of the symptoms of their illness. Such patients complain, for example, that business has been bad, that prices are too high, that they have spent too much on the medical case, and so on. They may express strong feelings of guilt that they have not provided better for their families, and may also suffer from extreme indecision on spending money since any purchase requires a restriction of their power to purchase something else. Such ideas may at times assume delusional proportions. In these persons the deeper fear and guilt indeed surround losses, but not necessarily the loss of money and economic security. It is a loss, or threatened loss, of an object of love.

A widow, G., who for many years had centered all of her interest in the progress and education of her daughter, became depressed with fear of destitution when her daughter's engagement was announced. The daughter, who had not been contributing to her mother's support hitherto, was going to marry a wealthy and otherwise acceptable young man. There had been financial reverses in the mother's life years before, but both her social position and her ability to provide for herself and the girl had been in reality fairly secure. At this time particularly her daughter's future seemed assured.

This kind of illness is more frequently seen in middle life or later when fears of destitution may be backed in reality by the limitation of earning capacity that has taken place. But we do not see such depression with the emphasis on economic loss when the relationships are undisturbed. Moreover patients of depressive character have all their lives unconsciously required reassurance against the possibility of loss which for them represents total destruction. Economic insecurity is one among several dangers to survival which could threaten them, and the expression of the depressive symptoms in economic terms is a culturally influenced 'omnibus' for many fears. The loss of a husband, mother, or lover may be followed by fears of economic disaster. It is the equivalence of economic security with emotional security that is at the core of this problem.

It is of particular interest to us that fear and guilt may be displaced from emotional to economic concerns. This is in part, of course, due to the symbolizations of early life which attach various emotional qualities to money and economic security. Money and what it supplies are tokens of love. The reliability of parents as sources of comfort may in part be limited

by their inability to offer economic security. On the other hand, it is the society that makes such symbols out of economic values by the weight it attaches to them. Money, security, and economic prestige may be of such value in our society that loss or the threat of loss can best be expressed in such terms; or, looking at the matter differently, there may be real danger of economic loss so universally felt that this displacement is easily effected.

Another approach to the question of insecurity is found in the study of the effects of *unemployment*. Our clinical material did not provide us with direct references to the effects of unemployment, since all the cases studied were seen during a period of full employment. Some of our patients, it is true, did suffer from a period of unemployment during the economic depression and reported something of what the experience had meant to them. Whatever insecurity these patients suffered on an emotional basis was augmented by the indelible impression left upon them in that period. This subject has, however, been the topic of very extensive investigation of which we shall cite only a few examples here.

Particularly of interest is the work of Eli Ginzberg (6) and Sol Ginsburg (7). Ginsburg studied, not patients, but a sample of New York population of unemployed during the economic depression to ascertain what unemployment as an actual disaster did to people. He found the consequences to be many and profound. The experience of loss of a job was in its psychic content similar to the loss of love suffered by the child of a rejecting parent. The unemployed families felt defeated, threatened in their status in the community. They suffered great loss of prestige. In the larger study of unemployment by Ginzberg, the sample case histories which were published reveal the accentuation of already existent neurotic trends in individuals and families who were unemployed and on relief during the economic depression.

Lazarsfeld (8), in a study on an unemployed German village, emphasized in particular that an effect of mass unemployment was a general contraction of economic wants which had the initial effect of warding off disaster. It is noteworthy that a prestige problem did not exist there, where everyone was the victim of economic disaster, and hence no one need make a judgment disapproving of himself. On the other hand (Reinhardt and Boardman (9), in another depression study, saw signs of "personality disintegration" in a whole series of families they studied who had become economically dependent. Similar general observations were made by Jacques Vié (10), G. K. Pratt (11) and others.

A comprehensive theoretical view on the effects of unemployment during the great economic depression based upon observations made at that time is to be seen in a work of Kardiner (12). He studied the diversity of elements that are involved in "economic security". Here again the particular economic problem with which he dealt was unemployment, but his formulations are of wider interest. He made the distinction we also have found useful between the manifestations of insecurity due to failure of subsistence, or a danger of such failure, and those due to loss of prestige. The former manifestations are more primitive, originating in the child's dependency on a reliable outer world in the person of the providing mother. Hence real

economic deprivation over a long period would represent total unreliability of the environment. To this the inner response must be one of shrinkage of interest and withdrawal from the attempt to master the external world. Kardiner was able to see such mechanisms in the character changes of some persons during the economic crisis.

Insecurity which is due to loss of prestige has other sources, namely, in the value judgments which are incorporated from the social environment by the growing child. These judgments are experienced as feelings of self-approval and self-disapproval. This operation is intimately associated with the correspondence of the actual performance of the person with ideal performance. But performance and achievement are subject to restrictions not wholly of one's own making. This is especially true of economic and social achievements which are at times sharply limited by the external world. Kardiner, whose formulations are hereby paraphrased, recognised that thereby self-disapproval might be a consequence of loss of prestige and hence that economic insecurity due to unemployment would be a cause of neurotic sense of guilt.

The observations of these writers go a long way toward underlining certain causal influences of *economic disaster* in the development of neurosis. It should be noted, however, that it is not only the threat to subsistence which they stress, but also the threat to self-esteem. This was particularly interesting in the studies of the unemployed when a very widespread irrational reaction to the loss of a job was the feeling of guilt at having thus incurred the disapproval of society. Psychoanalytic interpretations are pertinent here, in that they suggest that at deep unconscious levels the threat to one's self-esteem may also stimulate fears of destruction.

Tauber (13), in a paper on the determination of somatic symptoms by neurotic character, writes that having or not having money may have the symbolic significance (quite apart from the actual significance) to neurotic persons of having or not having the basic means of survival. For many patients money appears to equal food, and the dislocations of economic life are as threatening as any actual threat of starvation would be. A further psychoanalytic observation, in this case a speculative one, was made by Federn during the world depression: that the economic disaster resulted in internalization of aggressive impulses, and a tendency to regress to primitive states of mind.

The statistical studies made during the depression on the actual incidence of emotional illness which might be correlated with the economic depression are for the most part not specifically relevant to our study because they deal primarily with psychosis. Malzberg's (14) study of the classification of first admissions in the New York State hospitals gave a clear suggestion that change in the proportion of first admissions with respect to economic status was influenced by loss of employment or by financial loss. During the economic depression the economic factor became relatively more prevalent as an apparent causal element. With returning prosperity, the proportion involving the economic factor declined slowly. The small number of psychoneurotics included in his study showed a three fold increase in their

first admission rate during the depression. These psychoneurotics showed symptoms of the suicidal type as a rule, and could hardly be regarded as a cross section of the psychoneurotics in the community. Zubin (15), who commented on this work, thought that it would be difficult to establish on the basis of this type of evidence that economic stress increased mental disease. On the other hand, Dayton (16), studying the Massachusetts mental hospitals, says that "borderline cases were apparently peculiarly susceptible to the stresses of economic disturbance. The unstable of the borderline group, both first and readmissions, literally flocked to mental hospitals under the stresses of the depression".

Some, at least, of the students of the problem of suicide have come to the conclusion that economic stress may be a significant factor in the causing of self-destruction. This was a topic of Durkheim's (17) early empirical study of suicide, with the conclusion that not only unfavorable stress, but also prosperity, might be connected with the production of emotional disorganization. Later writers have emphasised the importance of change of economic status, from favourable to unfavorable, as an apparent cause of suicide, as against poverty itself, though there is uncertainty with regard to the latter question. Dublin and Bunzel (18) found disproportionate suicide rates at both the higher and the lower ends of the economic scale. Cavan (19) commented on the close correlation, in one set of statistics, between business conditions and male vs. female suicides. Although both men and women suffer deprivation by the husband's failure in business, it was the husbands for whom this was the more disorganizing experience.

Turning again to our own clinical material, we must consult another type of economic insecurity than that due to unemployment. One of our patients was a young man who had hitherto been employed in a small business in which he had occupied a responsible position and had not demonstrated any neurotic symptoms. He was seemingly the most stable member of his family. Within a few days after his opening up a small business venture, in which the family funds were invested, V. broke down with symptoms of severe anxiety and depression, withdrew from the new enterprise, and only gradually recovered. What else, if anything, besides the danger of loss of invested money, it meant to this man to embark on an independent business venture, we do not know because this case was not worked out in detail. It is something not uncommon in psychiatric practice to find that the achievement of an independent occupation or of promotion in status is followed by the precipitation of anxiety. There are many causes of anxiety at such times. A realistic appraisal of the situation may itself reveal that the new task is beyond a man's capacity. The risk may itself be also more than he is prepared to undertake. The responsibility for others' welfare can be too much. On the other hand, another kind of determinant may also exist in patients whose doubts of their adequacy are brought to the surface and underscored once they have attained a position which is unconsciously recognized to be in competition with the parents.

In a different way, a young married woman, W., in one series illustrated

the precipitating of an anxiety reaction at a time of economic insecurity. She became nervous and panicky, fearing to be alone, shortly after her husband's business had become first overextended and then threatened with collapse. The evidence in this case would clearly support the thesis that the appearance of illness at this time was partially determined by the patient's husband's business problems. This young woman had always been very dependent on her mother and had quite clearly in her marriage exchanged this tendency for a like relationship with her husband. Almost from the beginning there were other than the economic causes of her unhappiness, but it was particularly the husband's failure in business which lowered his protective significance to his wife.

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The Socio-technical Context of Industrial Inspection

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MUCH evidence has been produced to show that industrial inspectors are inconsistent both with each other and with their own previous performances. Many experimental studies of inspection, however, have removed the detailed individual task from its socio-technical context and have examined it purely as a psychophysical performance.

This may well mean that the results of such experiments are misleading when applied directly to industrial situations. Experimenters often use absolute consistency as their criterion of success in the inspection task, but the success of an inspector in an actual situation is often measured in rather different terms. The situations in the laboratory may be over simplified because much of the concomitant information which serves as a frame of reference for the inspectors' judgment is absent.

Binns and Burt (1922) carried out a study of the evaluation of cotton and wool cloths. Comparing the performance of textile experts they showed that, in judging six samples of cloth on five separate occasions, one expert produced an average correlation between trials of 0.97, while another's average correlation was -0.19. This difference may well be explained as a simple difference in judging ability between the two men. But the livelihood of both men depended on such judgments so there may perhaps be another explanation. In the business situation the expert knows the origin of any particular sample, its price and the general market conditions. He is aware of the use to which the cloth will be put and the nature of the processes through which it will pass. No evidence is given in the paper about the business situations in which these experts worked, but an examination of the conditions under which their judgments were normally carried out may have revealed systematic differences. For example, the second expert may have used much more contextual information in evaluating the cloth.

In a study of fruit sorting by Meadows, Lovibond and John (1959) the two best judges of peaches at the beginning of the season were the manager and the second fruit grader who had self-consistencies of 78% and 85%. Their cross-consistency at this time, however, was much lower. As these authors point out, the two men were using different scales of judgment although working in the same organization with the same explicit aims. While the manager and second fruit grader only agreed on the categorisation of 24 fruit out of 100 at the beginning of the season, as the season progressed successive tests showed agreement of 50% and 58%. Thus by working and communicating in the situation and by comparing themselves systematically during the study they eventually developed scales of judgment much closer to each other. However, an attempt to validate their judgment against the canners' judgment of peeled fruit failed because the canners

disagreed among themselves and with the fruit graders. There is little chance for inspectors to develop consistent standards under conditions where the quality range of raw material varies from time to time and where there is little or no valid 'knowledge of results' in terms of quality of the final product. While at the extremes of the quality range there are undoubted objective bases to the standards developed, a large proportion of the fruit varied apparently along dimensions for which no objective bases for decisions could be agreed. Nevertheless, as the season developed the work of the investigators and the natural communication between the graders led to an agreed standard. This was, within the fairly wide limits previously mentioned, arbitrary when assessed in terms of the final quality of the product. However, the study describes how it grew out of the real situation.

Studies of the skills of test bakers by Katz (1938) and of dairy skills by Harper (1952) show that the psychophysical bases of such skills are highly complex. Such analyses are of great use for simplifying and mechanising tasks and can also form the basis of systematic training programmes. However, as has been pointed out by Pearl King (1947), McKenzie (1958) and others, the operation of a perceptual skill in the work situation may be much affected by technical and social pressures. Scott Blair and Coppen (1942) have pointed out that people using psychophysical skills learn to integrate a variety of dimensions into what these authors call 'secondary gestalten'. These provide a perceptual frame of reference which gives varying weight to the different psychophysical dimensions and governs their interaction. It seems to us that most inspectors have to maintain such organised perceptual skills under varying social and technical conditions.

On this basis we question whether it may not be misleading to relate the results of, for example, vigilance experiments (such as Poulton's (1960)) directly to industrial inspection situations. In very few of these situations is the inspector required to attend continuously to uniform material in which infrequent, unidimensional, equal magnitude exceptions occur.

Harding and Manning (1929) in a study of strawberry sorting describe a job in which the explicit purpose was to separate first grade, second grade and bad fruit. Observation of the operatives showed that, when the general level of the fruit was good, they looked for and sorted first grade fruit almost continually, stopping only at intervals to separate out the second grade and bad fruit. Later in the season the quality deteriorated and second grade fruit predominated. Under these circumstances output fell. The sorters were continuing to sort out first grade fruit and this was no longer the most efficient method. The perceptual 'set' of the sorters was matched to the first situation and it was only when Harding and Manning pointed out the irrelevance of this 'set' to the second situation that they changed.

It may be that the firm's real purpose, as deduced from the activities of the sorters, was not to separate all three grades but to sort out quickly the commonest grade and sort the others later. This would be related to the needs of the production department if they had made the larger part of their processing apparatus ready for the predominant grade of fruit. But this

method of operation may well lead to a widening of the limits of the category of fruit being searched for, hence causing inconsistency but perhaps serving the dominant needs of the organization.

This examination of examples from the literature shows that a more detailed study of industrial inspection situations may lead to clarification of the criteria of performance which would best be matched to the purposes of the organization. The work of McKenzie (1958) has shown that the social structure of an organization, and the consequent pressures impinging on the inspector, result in what are sometimes gross deviations from the formal standards which he is supposed to use. However, the needs of an organization are complex, being a balance between output and quality and may not always call for unadaptive consistency.

To illustrate a method of analysing an industrial inspection situation let us take an imaginary example. An inspector could be employed simply to give the impression to the production department that a check was being kept on their standards of work. It might become acceptable in such a situation for an inspector to reject around 2% of the product regardless of the detailed properties of the items rejected. The inspector himself would probably make some attempt to be self-consistent in order to give meaning to his job. However, the 'knowledge of results' he can receive about his work would not be in terms of the control he was exerting on the production department. His consistency might be low, but this would have no consequences so far as his function was defined by the organization since his success would be measured in completely different terms. This, of course, is an imaginary case, but there is some element of this attempt to obtain gross control in many real inspection jobs.

However, the rejections made by an inspector in order to exert control successfully must have meaning to the production department over whom control is to be exerted. This, in effect, amounts to a demand for a certain degree of consistency in his performance, but the total production pressure is not towards complete consistency. In his role as a member of the industrial organization as a whole, the inspector is concerned with the maintenance of a certain production flow. When the production department is in difficulties there will be a considerable pressure to maintain a certain output by accepting some of those components which in more favourable circumstances he would be inclined to reject. On the other hand, of course, when output is high and of good quality the tendency is to raise the quality standard and this can be done at this time without unfavourable repercussions from the production department. There is, of course, a tendency for this relativity of judgment to occur without intent. The operation of this factor in inspection has been pointed out by Harding and Manning (1929) and Sheppard (1953).

In certain inspection situations the main pressure may not come from production but from the sales department. The performance of the inspector again need not be completely consistent but should match the demands made by the changing customer requirements and market conditions as interpreted by the Sales Department. These pressures from production and

sales may be at least partially conflicting. They impinge on the total inspection function, and the extent to which either of these will affect an individual inspector will depend on the structure of the inspection organisation and his place in it. There are, of course, great differences in the complexity of inspection departments and degree of specialisation of individuals within them.

Using this kind of approach to inspection situations we will now consider three cases we have studied in some detail. In considering these, we will attempt to work out a systematic descriptive method by which the significant variables can be identified.

One firm had been manufacturing heatproof sheeting for about two years. This particular product had remained subsidiary to and separate from the firm's main production. There was only one inspector in this department who while formally responsible to the chief inspector usually dealt directly with purchasing and sales departments. He worked in the production department in close contact with the operators and foremen. His responsibilities involved checking the quality of the raw materials, *e.g.*, printed paper sheets, and also carrying out 100% inspection of the finished 8' x 4' plastic sheets. The production process consisted in coating a number of paper sheets evenly with resin and bonding them together by heat and pressure in a large press. In dealing with the finished article the inspector stood at one end of the press and inspected each sheet as it came out. He had found that when he stood in a certain position the fluorescent light reflected off the sheet and this gave him a variety of cues. He had developed great perceptual skill in assessing the seriousness of any fault in terms of its type, magnitude, and position on the sheet. The chief inspector reported that he had tried a number of other people for quite long periods on this particular job but found no one who was able to carry it out successfully.

A detailed examination of this task showed that the inspector's job was to satisfy the changing and conflicting needs of the sales organization, production department, and raw material purchasing department. The sales director, production manager, and purchasing officer often came to discuss the product with this inspector who had approximately charge-hand status. Problems with the manufacture of this product had led to 70% being rejected at one stage. In overcoming such difficulties the inspector had learned to recognise where in the manufacturing process certain types of defect arose (faults which appeared very similar often had quite different causes) and this inspector felt that one important part of his job was to warn the production operatives quickly about any deterioration in the process. This meant that when production ran into difficulties he spent most of his time providing them with information for controlling the process. However, on other occasions the sales director would approach him about a complaint and as a result of such discussions he would raise his standards with regard to certain types of fault. He usually attempted to assess the consequences of raising his standards in order to keep them at a realistic level, particularly where the fault in question raised special problems for production. This man was also responsible for the inspection of the raw materials, and his conse-

quent knowledge of these affected his judgment of the final product.

No doubt there were defects so gross that he would have rejected them at all times and some sheets so excellently made that he would always accept them. However, between these two extremes there were many components which he would accept or reject depending on external circumstances, particularly the control which was exerted on him by other parts of the organization and the control he was attempting to exert. Within a narrower range there were components which he would accept or reject on a more random basis, especially on those occasions when his interpretation of the circumstances was imperfect. Nevertheless, he was a successful inspector who had been found extremely difficult to replace.

While this is a very unusual case, the position of the total inspection organization concerned with a particular product is usually of this kind. But the demands on the individual inspector may be very different as can be seen from the following example taken from razor blade manufacture.

The company concerned consists of a number of semi-autonomous divisions. The razor blade division had several production lines. Inspection took place at a number of points in the process, but we are here concerned only with final blade inspection which occupied about 80% of the inspection personnel. Each inspector sat at the end of the manufacturing line and received one sample blade every six minutes. This he inspected under a microscope. He also received a charger containing about 2,000 blades. This charger is a frame over which the blades are slipped, and it has an adjustable end so that the blades are held firmly in position. When checking the sample blade the inspector picked it up, inspected the quality of lacquering and looked for any obvious visual defects. He flexed it between his fingers to find any cracks and then placed it in a jig under the microscope. The jig was set so that the edge of the blade was viewed through the microscope and the blade could be moved along so that the whole cutting edge could be inspected. When this was completed the blade was reversed and the other side of the cutting edge was inspected. The blade was inverted and both sides of the cutting edge were inspected. It was taken out of the jig and overall measurements were taken to establish both the size and degree of eccentricity of the blade.

In addition the bulk output of blades in the charger was inspected. The inspector held the charger in front of him using a motion pattern which gave eight views of the cutting edges; from this he was able to pick out any defective blades. Trainees on this task are given four weeks in a training school and then do a number of weeks on production while all their work is checked by another inspector. When they have reached a certain standard they are allowed to do the job on their own, but the chief inspector reports that it usually takes many months before a new inspector is able to do the job really satisfactorily.

These first line inspectors' standards were maintained by a fairly complicated organization. The output from each inspector was sampled by an assessor inspector and a weekly performance figure for each inspector was calculated from these checks. In addition the rejected product was inspected

to keep a check on the quality of rejection. The assessor in turn compared his standards systematically with the chief inspector and his deputy.

In addition to this system of inspection in the blade department, the company had a standards department which sampled the goods from all parts of the production process and from the open market, and whose task it was to maintain contact with the company's factories in other countries.

The close control exerted by check inspection and inspection supervision, the latter particularly through weekly consistency performance figures, ensured that the limits within which the inspectors exercise discretion were very close. Within these limits the variations still appeared to us to be responses to the production demands and raw material changes which were allowed to impinge on the individual inspectors. One way in which inspectors varied was in the importance they imputed to different types of fault. Analysis of this situation has led us to conclude that this kind of variation occurred because there is no effective method by which the inspector received 'knowledge of results' in terms of the ultimate effectiveness of the product. Elaborate statistical studies are continually carried out by the company standards department, in an attempt to relate the descriptive variables used by inspection to the effectiveness of the final shaving operation; but it is impossible for any individual inspector to begin to relate the particular faults to the final performance of the product.

While the individual inspector in this organization was effectively protected from most of the pressures exerted on the man in the previous example, these pressures did impinge on the total inspection function. The sales pressure was mainly taken by the company standards department and interpreted by them to the chief inspector. The chief inspector was also subject to demands to take account of the state of incoming raw materials, and the consequences of production schedules, in issuing instructions to his inspectors. There are occasions (McKenzie, 1958) when this forced him to issue explicit instructions to relax the pass standards for a given period. However, this was done in terms which apparently allowed the inspector to preserve his scale of quality while accepting blades lower on this scale.

In this situation the chief inspector formed the point at which the pressures were balanced, so the line inspector was protected. While individual inspectors do react to the demands arising from the need to provide the production line with control information, they provide the best example we have seen of the high degree of consistent performance which can be achieved when the socio-technical context is appropriate to the task. The discrimination achieved by the inspector is of a very high order allowing him to quantify about 40 faults most of which are not detectable to the layman.

It is generally agreed that the purpose of a firm is to produce a product which functions effectively in the consumer situation and if this effective functioning could be adequately defined, the limits of required consistency should be set by the limits of effectiveness needed in any particular situation. In a specialised electronic instrument firm the standards of final inspection were of two different types, one in terms of the effective function-

ing of the instrument, *e.g.*, soldered joints, and the other in terms of relative consistency of appearance and operation within each instrument or group of instruments where these were for the same customer. This particular inspection job at first sight appeared impossible, as nominally hundreds of different types of fault could occur. The probability structure of the material was such that, given a thorough examination of the first instrument from a batch, the experienced inspector could develop an inspection programme which allowed him to catch the majority of faults with only partial inspection. However, this programme was systematically adjusted in relation to the faults that were found. While there were some important aspects of the instrument on which consistency within certain limits was functionally required, the inspector described his job in terms of the control that his activity exerted on the assembly team with whom he worked and the many decisions that remained with him were taken with this in view. Thus we see that the demand for consistency in the final product arises largely where the consumer has opportunities for comparing successive items, *e.g.*, razor blades.

These three examples of inspection can all be analysed in a similar systematic way. In each case we were concerned with the perceptual skill of the inspector in dealing with the social and technical requirements of his task in the total working situation.

An inspector's task is almost entirely a function of the information that reaches him. It arrives as instructions about what to do and how to do it; as messages about anything else that might affect his quality decisions; and as consequences of his previous performance. Some of this information may come through his interaction with other people, and some as changes in the product.

Behaviour does not result from the information impinging on a person but from the meaning he attributes to it. Meaning is partly a function of personality and partly a function of the timing and context of the information. We are not here concerned with the personality.

Every position in the firm receives instructions and may receive information from other positions in the firm or from outside. Together these are interpreted to lead to action, instructions to subordinates, or information for other members of the firm.

The inspector receives instructions about the products to be inspected and how to inspect them. The instructions about different aspects of his task can differ in precision, and his success in carrying out these instructions can be reviewed at different intervals. Once this 'instruction giving and success reviewing' system is in operation further instructions acquire meaning from the way in which the system has operated in the past. He also receives information from other positions in the firm, *e.g.*, production, sales and raw material departments. This has meaning for him in terms of his past experience. He learns of the consequences of his past performance from its effect on the product and from certain people in the organization. He gets knowledge of results about how well he has sorted out the product and about effectiveness of the information he has provided for control. His use

of this feedback will depend partially on his evaluation of the people and processes from which it comes.

The instructions, the contextual information, and the knowledge of results, together determine his perceptual 'set' towards the material to be judged. The instruction which he receives will determine the general area within which his detailed set can develop. The additional information changes the context within which the product is judged and differentially affects his set towards different aspects of the display. The particular nature of his knowledge of the consequences of his performance will largely determine the directions in which he can develop his perceptual sensitivity.

It seems to us that many experiments on inspection have been carried out with fixed instructions, and instructions often remain constant for quite long periods in the industrial situation. But the assumption is often made that the contextual information remains constant, or does not exist; and this is very unusual in industry, although some inspectors are well protected against such influence. There seems to be no counterpart in experimental situations to the pressure and control exerted on the inspector by his knowledge of the consequences of his action.

Experimental situations are both simpler and more general than usual life situations, but it seems to us that an analysis of the contextual information and feedback systems which determine the nature of the inspector's task will lead to more fruitful experimental designs.

This paper resulted from a survey of inspection tasks carried out as part of a research project on inspection and quality control financed by the Department of Scientific and Industrial Research. We are indebted to Dr Marie Jahoda, Mr R. Borger and our other colleagues for much advice and assistance.

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Industrial Fatigue*

By E. G. CHAMBERS

INTRODUCTION

IN December, 1917, the Department of Scientific and Industrial Research and the Medical Research Council were asked to appoint a Board to investigate industrial conditions and shortly afterwards the Industrial Fatigue Research Board was established with the following terms of reference: "To consider and investigate the relation of the hours of labour and of other conditions of employment, including methods of work, to the production of fatigue, having regard both to industrial efficiency and to the preservation of health among the workers." For some years the Board's investigators studied problems relating to hours of work, rest pauses, vocational guidance and selection, etc., most of which had the consideration of industrial fatigue to the fore. Later, in 1929, the Board, now affiliated solely to the Medical Research Council, widened its scope of enquiries and became the Industrial Health Research Board with wider terms of reference. The majority of the Board's reports dealing with fatigue were published prior to 1939 and are now mainly out of print, but since much of this pioneer work is still worthy of note a summary of findings and conclusions from these reports is herein presented. The summary occupies the bulk of this paper but certain observations from other sources on the topic of fatigue have been added. A full list of titles and authors is appended for those who wish to consult the original reports and have access to libraries where they may be found.

NATURE AND MEASUREMENT OF FATIGUE

Fatigue is a very well-known phenomenon and everyone has experienced feelings of tiredness and lassitude. In moderation fatigue is not harmful nor even unpleasant, particularly when a period of rest is anticipated, but excessive fatigue causes deterioration in efficiency, irritability and kindred subjective effects and may cause the worker to draw on funds of energy to an extent from which he cannot readily recuperate. The results of this in extreme cases may be reflected in sickness and mortality records. All this is fairly commonly known, but difficulty arises when attempts are made to consider fatigue from a scientific point of view. It is easy to talk about 'moderate' or 'excessive' fatigue but the use of such terms denotes an idea of quantity and quantity of fatigue is a concept which has little or no scientific value since it cannot be measured directly. For years psychologists attempted in vain to devise a 'fatigue test'—a sort of meter which could be applied to a person and register his degree of fatigue—and indeed Muscio (1921) went

*Between 1919 and 1938, the Industrial Fatigue (later Health) Research Board produced many valuable reports on industrial fatigue. Most of these are now out of print, but reference to them is often desirable. Mr Chambers has prepared this summary mainly for research workers and students who cannot readily gain access to the original reports, all of which were published by Her Majesty's Stationery Office, London.

so far as to state that the term 'fatigue' should be absolutely banished from precise scientific discussion.

The investigators of industrial fatigue were therefore compelled to find some indirect measures. The chief of these were level of output and rate of working and we find statements such as the following:

'Output forms the most convenient quantitative measure of the fatigue induced in the industrial worker by the pursuit of his calling, and it is improbable that a more satisfactory test of the immediate effects of fatigue will be devised, because of the complexity of the phenomenon, though the more remote effects are sometimes suggested in an impressive manner by sickness and mortality records'. (5)* A drop in the rate of production may be due to 'a lowering of the productive capacity of the worker, which is accepted as a sign of fatigue.' (9) 'Fatigue is not to be measured in terms of work performed and is not distributed between workers in the ratio of the work they do, whether necessary or unnecessary.' (17) 'Subjective indications constitute no reliable evidence either of the absence or presence of actual fatigue, since such indications may be present when objective signs of fatigue are entirely absent, or, on the other hand, fatigue may actually develop to a considerable extent before subjective indications of such a condition are perceived.' (8) 'The time required to attend to loom stoppages is greater in the afternoon than in the morning spells of work, and increases progressively throughout both the day and the week. These variations in working capacity, although they have no appreciable effect upon output, are important as indicating the extent to which fatigue may be present in weaving.' (23) 'There is reason to believe that boredom is responsible for a greater loss in output than fatigue.' (63)

These statements which, as may be seen, are not completely consistent, illustrate the difficulties of assigning observed effects to the influence of fatigue. It is axiomatic that fatigue adversely affects efficiency and there is evidence that rest pauses, etc., which presumably retard the onset of fatigue, do have a beneficial effect on efficiency. However, fatigue as a state of the organism still defies direct measurement and its presence frequently has to be assumed or inferred from indirect observation.

TYPES OF FATIGUE

Fatigue itself is not a clear-cut concept. Various forms of it have been described or named, sometimes in terms such as 'nervous fatigue', 'fatigue of the attention', 'mental fatigue'—terms which have little or no scientific connotation. The simplest form to understand is dynamic muscular fatigue, *i.e.*, fatigue set up by actively using muscles. This is very largely physiological and chemical in nature and leads to increasing feebleness of response of the muscles and 'stiffness' due to the formation of lactic acid. Adequate rest usually results in complete recovery. Fatigue in muscular work can also be avoided to some extent by rhythmic activity where effort and rest

*Numbers in brackets indicate numbers of I.F.R.B. and I.H.R.B. Reports listed at the end.

are incorporated in the same cycle, as in breathing and the beating of the heart. (See later under RHYTHM.)

However, muscular work may be divided into two classes: (a) that which is performed with such vigour that the body runs into an oxygen debt which absolutely necessitates the taking of rest pauses, and (b) that which is performed with a less degree of vigour and on that account permits the attainment of the so-called 'steady state'. (29) It is important that the second class should not be exceeded in industrial work. 'In some forms of industrial work it may occasionally be necessary for the worker to exert himself so strenuously for a short time as to run into oxygen debt, but there can be little doubt that such work is extremely fatiguing and should be avoided whenever possible.' (29) In laboratory experiments on pulling a dynamometer the 'steady state' was attained in various conditions, but it did not follow from this that there was no increase in fatigue. 'Undoubtedly the general state of fatigue of the body continues to increase at a considerable and accelerating rate, in spite of the fact that capacity for work, as tested by the dynamometer, remains constant.' (29)

Apart from dynamic muscular fatigue there is also 'static' fatigue incurred when muscles are maintained motionless in a state of contraction. This may occur in leg muscles after long periods of standing and cause stiffness or rigidity of the muscles (8), or in muscles maintaining postures when the worker is sitting for lengthy spells (77).

The concept of 'mental fatigue' is vague and ill-defined. Thorndike in 1921 wrote: 'What I wish to emphasise is that we can *feel* mentally fatigued *without being so*.' Concentrated mental activity over a lengthy period certainly leads to subjective feelings of fatigue, but it is a question how far these feelings are really mental. Static bodily fatigue is very probably present and there may be failure of ability to concentrate. This latter, however, may arise from causes other than fatigue. It is true that prolonged work may lead to a lowering of the resistance to external or internal distractions—noise, hunger and thirst, etc.—but lack of concentration may also be due to purely psychological causes such as mental conflict or the rivalry between personal and work problems. 'Nervous fatigue' is probably a complete misnomer for this state; nervous tissue is almost indefatigable and the only other application of the word 'nervous' would suggest neuroticism and everyone who experiences mental fatigue is not necessarily neurotic.

Another writer stated that noise hastens the onset of 'fatigue of the attention' but there is no experimental evidence to support this. 'The most reasonable view to take about mental fatigue is that it occurs only when mental processes which actually conflict, or interfere, with one another are simultaneously stimulated.' (65) Laboratory experiments on mental fatigue carried out on lines similar to those used for investigating muscular fatigue (*e.g.*, experiments with an ergograph) have yielded little of value; output in a mental task was found to bear no relationship to reported subjective feelings of fatigue (Poffenberger, 1942). Commenting on work on these lines, Bartlett in 1943 wrote: 'Through it all runs one great unverified

guess: fatigue must consist of diminished efficiency of specific performance due to repetition of that performance.'

Since these early experiments on mental fatigue were too simple and unrealistic, experiments on the effects of prolonged skilled activities were carried out and led to interesting conclusions which were described by Bartlett (1943). Some of these, stated briefly, were: 'Skill fatigue is marked by a progressive lowering of standards of performance.' 'Effective stimuli acquire an "indifference range" within which stimulus changes, though they may be appreciated, do not call for compensating activity.' 'The overall results of the experiment showed a non-significant increase in wrong actions done at the right time, but a highly significant increase in right actions done at the wrong time.' There were also some striking subjective phenomena: operators' reports became increasingly unreliable; awareness of physical discomfort increased enormously; irritability increased with increasing fatigue and was expressed vocally.

This brief discussion of various types of fatigue indicates quite clearly that fatigue is not a simple state of the organism. Further, there seems to be no reason to regard industrial fatigue as a specific variety; rather it would appear that dynamic and static muscular fatigue, mental fatigue, boredom, and skill fatigue all occur in varying degree amongst workers in industry. Insofar as these have deleterious effects on efficiency and health it is important to attempt prevention or alleviation. Obviously there can be no panacea; for example, rest pauses may be effective in reducing fatigue in certain repetitive tasks but may be ineffectual in other types of work. The contributions to the solution of the problem by the investigators of the Board are described in the following sections.

HOURS OF WORK

In the 1914-18 war increase in the output of munitions was vital. Hours of work were accordingly increased to 70-90 per week and sometimes to over 90 hours. However, output did not increase proportionally; for instance, it was found that a 12-hour day produced no more than a 10-hour day. A Health of Munition Workers Committee was set up and as a result of investigations, largely of a statistical nature, recommended the reduction of hours and the preservation of the Sunday rest-day and ordinary holidays. Figures usually quoted showed that the effect of reducing hours of actual work from 58.2 to 51.2 for men engaged in heavy work resulted in a relative increase in total output from 100 to 122 and an increase in hourly output from 100 to 139. It was also found that after a continuous period of overtime output rate did not improve for some time after the re-introduction of shorter hours, suggesting that a lasting state of fatigue had been set up by the lengthy periods of over-long hours of work. (Emergency Report 1.)

Later investigations produced the following results:

i. In an investigation of the output of tinplate millmen working on different shift systems it was found that the hourly output when 4-hour shifts were worked was 11.5% greater than that for 8-hour shifts. For 6-hour shifts that hourly output was 10% greater than for 8-hour shifts.

The working week was 2 hours shorter under the 6-hour system but the total week's output was still 8.3% greater than that under the 8-hour system. (1)

ii. Women engaged on shell-making worked either two 12-hour shifts or three 7-8-hour shifts. Comparison of the average hourly output showed a higher output (8.7 as against 8.17) in favour of the shorter shift system. Eliminating a fixed-speed machinery operation, it was found that the time required for a fixed amount of work was 19.5% less in the shorter shift system. Hourly output curves showed a considerable falling off in the last hour of the longer shifts but none in the shorter shifts. (2)

iii. In the iron and steel industry, reduction of hours from 12 to 8 per shift caused little increase in output for men on pig-iron production and steel rolling. However, for those on open hearth steel production, reduction from 12 to 8 shift hours caused an increase in total output of 9% at one works and 2% at another. During 16-hour shifts, which occurred once in three weeks in pig-iron production, rate of work was 8-15% less than in 8-hour shifts. (5)

iv. When hours of work are reduced there is often no change in hourly output for some weeks; then it mounts slowly but takes a long time to attain a steady value. Adaptation time is usually shorter with simpler operations. For example, adaptation was about 2 months when shift hours for tinplate millmen were reduced from 8 to 6, but was 13 months for open hearth steel workers changing from 12 to 8-hour shifts. When tinplate millmen changed back to longer shifts output fell almost at once. "This evidence demonstrates the evil effect which intermittent periods of overtime must have on output." (6)

v. In silk weaving, investigation suggested that unbroken $4\frac{1}{4}$ or $4\frac{1}{2}$ -hour spells of work were too long; "but it does not appear to be possible to settle the point at issue merely by measurement of output rates; the need for a test . . . to determine the degree of fatigue existing in the individual at any instant is emphasised." (9)

vi. A change from a two 10-hour shift system to a three 8-hour system in the glass-blowing industry led to a higher hourly output, although total output in the shorter shift did not quite reach that in the longer shift. (24)

vii. A survey of numerous factories in 1940-41 led to the conclusion that lost time through sickness, injury and absence without permission varied with the weekly hours of work, usually being low when less than 60 hours were worked but increasing as hours increased up to 75. It was suggested that over a lengthy period weekly hours should not exceed 60-65 for men and 55-60 for women. Reduction in excessive hours of work, together with the introduction of staggered holidays, led to an increase in the rate of working. (Emergency Report 2)

It may be concluded from the foregoing that very long hours of work, daily or weekly, affect rate of working adversely, and there comes a stage where there is little or no increase in total production by working more hours because the hourly output rate falls so low. A universal standard of

the length of the working day or week cannot be established since the number of hours that can be worked productively varies with the nature of the work involved. The optimum economic hours of work could be determined for any particular occupation only by experiment and observation over a lengthy period. The relationship between hours of work and production is not a simple one depending solely on the development of fatigue. Equally, perhaps more, important are such considerations as motivation, working conditions and human relations.

In these days when there is a widespread demand for a 40-hour 5-day week much of this discussion may seem academic. However, scientific investigations have been made. Unfortunately, when a state of emergency ceases, scientific reports tend to find their way into pigeonholes and oblivion, and the next emergency has to be dealt with by a generation which is largely ignorant of previous findings.

REST PAUSES

Early investigations into working conditions revealed that workers took voluntary rest pauses whenever they felt inclined, either because they were tired or because they felt disinclined to work through boredom or for other reasons. The number and length of rests taken depended largely on the nature of the work. For example, in one investigation (41) it was found that men on moderately heavy work such as road-making, agriculture and dock labouring took about 11 minutes rest per hour. If the work was regular, the men took short voluntary rests regularly at about 6-minute intervals. In heavier work longer rests were taken. Pitch loaders took 22-26 minutes per hour; tinplate rollers took 14-28 minutes; colliers took 7-22 minutes. In the last case, 5-9 minutes was voluntary rest, each rest lasting less than a minute. Involuntary rests were less numerous but three times as long. It was calculated that involuntary rests had only one-fifth of the value of voluntary rests in relieving fatigue.

In another investigation (1) it was found that millmen rolling red-hot steel took on the average 3.6 rests per hour, totalling 10.2 minutes per hour under a 6-hour shift system and 12.5 minutes per hour with 8-hour shifts.

Observations such as these and others indicate the necessity for periods of rest, particularly in work making heavy physical demands. The question then arose, is it preferable to allow workers to take rest pauses voluntarily whenever they feel disposed, or to institute organised rest pauses of a certain length at fixed times? It may be stated at once that no answer of universal application has been found. Whether or not organised rest pauses are possible or beneficial depends on the nature of the work. For example, it was concluded that it was quite impractical to attempt to organise rest pauses for colliers. (41) Experiments have been made both in industrial settings and in the laboratory and certain results may be cited.

In the boot and shoe industry double presses were worked by two girls working 46 hours a week. The experiment was tried of using three girls to a press, each girl working 40 minutes and resting 20 minutes in the hour, which meant in effect that each girl worked about 30 hours a week. It was

found that over a period of 7 to 24 weeks output on different presses rose by 34% to 75%. The girls, who were sceptical at first, were quite converted after some weeks of trial; they said that their health had improved and that they were no longer tired at the end of the day. The number of accidents they sustained was also reduced. (10)

A small experiment on one worker roughing spoons showed that the time taken to rough a dozen spoons was 32' 30" when the girl took voluntary rests but was only 31' 20" when she took an organised rest pause of 5 minutes per hour. Work was also less variable in the latter case. (15) Again, observations on one woman on laundry work showed beneficial effects from introducing a 15 minutes rest pause in a 4 or 5 hour spell. (22) Girls engaged on the light work of labelling small packages showed an increase in output after the introduction of a 10 minute rest. The effect took several months to reach its full amount, which also varied with the speed of the workers. The quickest third improved by 8%, the intermediate third by 13% and the slowest third by 17%. It was difficult to determine how much of the improvement was due solely to the rest pause since other factors, such as improvement by practice, were also present. (25)

Laboratory experiments on monotonous work showed that there was a considerable reduction in output about the middle of a work spell. This could be avoided to some extent by introducing a 15 minutes rest pause half-way through the spell. Output increased not only after the rest but also before it. One rest of 15 minutes was found to be slightly better than two breaks of 7½ minutes each. (25)

Observation of the effects of a 10 minute rest in the middle of the working spell for certain repetitive jobs (handkerchief folding, hand-ironing and stamping presses) showed an increase in the rate of working from 1.5% to 8%. The increase occurred both before and after the pause. In most cases there was an increase in total output. Variability in rate of working decreased, as did amount of lost time, and the workers were more contented and satisfied. It was also concluded that an authorised and expected rest was more beneficial than an enforced unexpected stoppage of the same length. (32)

The adoption of a rest pause during a 5-hour spell for women working on a variety of light occupations was held to be beneficial both physiologically and psychologically. A 10 minute pause was thought to be better than one of 15 minutes. Compulsory rest pauses were disadvantageous to output in some semi-continuous processes. This could be avoided to some extent by using temporary substitute workers and staggering the rest pauses. (47)

It is evident from these miscellaneous findings that in many types of industrial work rest pauses are beneficial. The actual number, length and position in the working spell of rests to have the optimum effect remain a matter of research in any particular instance since no general rule can be deduced. In Report 42 a review of the results of investigations, not only by the Board, is given. From this the general summary is quoted:

The foregoing considerations show that when suitable rests are intro-

duced in connection with laboratory or industrial work, the result is generally an improvement in the quality and quantity of output. In most cases the total output also is increased, in spite of the decrease in the actual time worked.

The effect of a rest is particularly beneficial in repetitive work of a monotonous character, and the influence on production is most marked in processes which are largely dependent on the activities of the worker. Heavy muscular work, and operations involving a continuous standing or sitting posture, are also suitable cases for the introduction of rests. The speed of industrial operations is another factor which should be considered in relation to rests. Industrial conditions which require a working rate in excess of the natural rhythm of the body are conducive to fatigue, and, if unavoidable, their effects should certainly be alleviated by means of suitable rests.

There is evidence to show that in certain cases the beneficial effects of a rest are not limited to the period of work following the pause but are also noticeable before the rest occurs.

In general, however, the published work relating to rest pauses in industry tends to raise more problems than it solves. In many cases there is a lack of unanimity in the results obtained, a feature which is largely due to the unscientific methods of procedure adopted. In industry, the introduction of pauses has been mostly empirical and carried out without due regard to the nature and conditions of work. It is not surprising, therefore, that the effects have some times been unsatisfactory and further developments in consequence discouraged. Before rest-periods are introduced, a careful investigation of the existing conditions of work should be made, and a typical curve of output obtained. A consideration of such a curve will show whether a rest is necessary and will indicate the most useful position for the pause. Results obtained have shown that in certain cases shorter but more frequent rests are preferable to fewer but longer rests, but further investigations are necessary in order to determine the most suitable number, duration, and distribution of rests for different types and condition of work. Investigations are also needed on the best methods of utilising rests in order that the most favourable results may be obtained.

Individuals vary in their susceptibility to the effects of rest and consequently the effects are more favourable in some cases than in others. Theoretically, the most suitable arrangement of rests will be different for different individuals, but in practice it is necessary to determine the conditions which will give the best average results. Further, an operative rests better when all the others are also resting, and her inclination to work is stimulated by the atmosphere of industry in the room.

The possibility of combining rests with team work has not been sufficiently explored. The few results which have been obtained show that such an arrangement is capable of reducing the cost of production and at the same time enables the work to be done with less fatigue.

The above was written in 1927. Since then there does not appear to have been much published work on the subject of rest pauses.

RHYTHM

As previously mentioned, a normal heart will continue to beat tirelessly and lungs to breathe for many years. This is possible chiefly because they are rhythmic processes incorporating a rest period in each cycle of activity, so that no oxygen debt is incurred and no accumulation of fatigue is set up except in unusual circumstances. It is possible that in some industrial occupations movement cycles embodying a similar principle may be devised. Such cycles may be found for repetitive work by scientific motion study. "The underlying principle of motion study is rhythm and not speed. We must look upon the best set of movements as the easiest set and not the quickest set." (14) The same report describes how rhythmic curvilinear movements save fatigue by utilising the momentum of the moving hand and arm to do productive work instead of wasting energy by overcoming first the momentum and second the inertia of the limb, which occurs in angular movements when the limb has to stop and start again abruptly. In a further experiment on motion study it is concluded that "the attempt to reduce the number of strokes, to do more work with the hands and less movement with the body, quickly leads to a more rhythmic use of human energy with increased comfort to the individual and improved quality of the work." (15)

Another investigator writes: "When the work done by the active muscles shows no sign of diminution over long periods of time, it indicates that the energy expended is completely restored during the intervals of rest. In all kinds of activity there are alternating conditions of work and rest which entirely prevent the onset of fatigue, and there is little doubt that certain industrial processes would benefit considerably by the discovery and utilisation of these optimal conditions. Wherever such rhythmic conditions already exist there is obviously no need for the further introduction of rest pauses." (25)

In a laboratory experiment involving pulling against a strong spring at half-minute intervals for two 2½-hour spells the following was concluded: "The general tendency for the curves to increase throughout the spell suggests that the half-minute intervals between successive pulls was sufficient to prevent the onset of fatigue and that muscular co-ordination improved with exercise. In this case the test is an example of rhythmic activity without any appreciable degree of fatigue or monotony." (26)

Another experiment on pulling a dynamometer rhythmically over a long period showed a relationship between the amount of physical work done and the period of rhythm. "When the dynamometer is pulled at regular intervals the initial strength of pull falls rapidly for about 4 minutes and then for a long time keeps at a nearly constant level (the 'steady state'). The height of this depends on the frequency of the rhythm, being 53% on the initial height when contractions were made every 1½ seconds and 85% on it when made every 4 seconds." (29)

In an investigation of barrow work at a brick factory it was found that the normal work cycle automatically ensured that the worker after wheeling the loaded barrow changed his posture and performed totally different types of muscular movement for a few minutes. "This gives him almost all the advantages of a rest pause. . . . If the worker conforms to the conditions of optimum efficiency in regard to load, arrangement and speed, the alternation of the stages in the work cycle may enable him to maintain a high efficiency over a long period." (50)

The comparative effects of variety and uniformity of work were also investigated. Among the conclusions reached were: (i) uniformity in the method of procedure is generally less productive and conducive to greater irregularities in the rate of working than are varied forms of work; (ii) many changes are detrimental to output because of their interference with the swing of work; (iii) in repetitive work of a fatiguing nature changes in the form of activity should be relatively more frequent; (iv) a high degree of resemblance between the alternating forms of activity, though subjectively satisfying, is not conducive to increased output. (26) (52)

It was also discovered in a study of machine feeding processes that if the speed of the machine was too great the workers were unable to adopt a rhythm of working which was natural to their capacity. This led to embarrassment and emotional upset and had an appreciable adverse effect on output. On the other hand, too slow a machine speed was conducive to boredom and a certain amount of strain. (82)

From the evidence adduced it seems certain that the onset of fatigue may be prevented or diminished by the adoption of a rhythmic method of working where possible or by the use of a work cycle which incorporates either a rest period or a change in the muscular activity required.

DESIGN OF MACHINERY

In the previous section the effects of machine speed on preventing a natural working rhythm have been mentioned. Investigations indicate other factors in machine design which may induce fatigue that is out of proportion to the productive work performed. Some of the factors which may produce avoidable fatigue were: the extent, kind, speed and rhythm of movement involved; posture imposed by the machine; physical effort demanded; shock due to arrested movement or cessation of resistance; vibration; noise; obstruction of part of the machine to the worker or his vision; the movement of parts of the machine through a wide visual angle; unnecessary work and discomfort caused by having to make adjustments.

Suggestions for improvements to a large variety of types of machines were made. (36)

PHYSIOLOGICAL COST

Work involving muscular effort, such as lifting and carrying heavy loads, wheeling laden barrows, make physiological demands which may be partly reduced by the proper distribution of loads and by the adaptation of

mechanism to the physique of the worker. It was found that any load to be carried which causes a considerable departure from the erect posture inevitably leads to a high physiological cost. For women engaged on continuous work it was found that the maximum physiologically economic load was 50 lbs. for a well-disposed load and 40 lbs. for an ill-disposed load. The use of a shoulder yoke which enables an upright posture to be maintained was found to be the least physiologically expensive method of weight carrying. (29) (44)

In barrow work at a brick factory, it was found that the physiological cost could be reduced by disposing the load of bricks on the barrow to suit the height of the worker. Also, the optimum rate of pushing the barrow was the normal brisk walking pace of the individual worker. Measurement of physiological cost was in terms of oxygen consumption during work. (50)

NOISE

"Excessive noise is to the human organism very much as excessive friction is to the machine: it wastes energy." In the case of weaving, the effect of noise was to lower the rate of output between 2% and 3% of that obtainable when the noise intensity was reduced by the use of ear-defenders to 81 decibels. "In terms of personal efficiency this is equivalent to an increase of about 7½% with subdued noise." The ear-defenders caused a 50% reduction in apparent loudness and it is possible that further reduction in noise intensity would produce additional benefit. Tolerance of the psychological effects of noise—irritation, annoyance and distraction—may be established to some extent but some effects still remain. "Excessive noise is by no means a negligible factor in determining industrial efficiency." (70)

Laboratory experiments on the effects of noise on non-auditory tasks were made. "On the whole all the experiments agree that noise in general tends to produce slight and readily recoverable diminution of efficiency. We think that its direct effects upon non-auditory performance are commonly greatly exaggerated. It remains possible that, noise being very generally disliked, its effect upon a social group may be strikingly different from those upon the individual performer." (65)

It does not seem possible to measure the direct effects of noise in producing fatigue but it does appear probable that the unpleasant psychological effects of noise do tend to augment the onset of fatigue in industrial work. On general principles, therefore, it is suggested that the elimination of unnecessary noise and the reduction of essential noise by the use of ear-defenders could have only beneficial results.

EYE STRAIN

Several experiments on the relief of eye strain in fine work have been made. In some occupations, such as linking in the hosiery trade, it is difficult to distinguish details of the work owing to the absence of visual contrast. The eye cannot maintain such a condition for long periods without fatigue.

The use of glasses of a suitable magnifying power to reduce the strain due to extreme accommodation resulted in a considerable increase in the rate of working and a reduction of fatigue. (40) Further observation on weavers and workers mounting filaments (49) and in other occupations (57) yielded confirmatory evidence.

TRAINING

In a laboratory experiment on training subjects to perform a simple chain assembling task it was concluded that there was no value in extending the daily training period beyond 80 minutes. A 4-hour spell was too long for maximum efficiency to be maintained. It also appeared that rest pauses were not justified in a 2-hour spell. Finally, it was suggested that "variability rather than output is the more sensitive measure of fatigue." (67)

It has also been found that better workers in certain jobs expend less energy than poorer workers. (15) (17) This indicates the importance of training workers in the best methods.

ACCIDENTS

The influence of fatigue in accident causation was shown in records obtained in a shell factory. Men worked a 61-hour week. When women worked the same hours their accidents were 91% as numerous as those of the men but fell to 78% when hours were reduced to 39½ for the women. (19) A laboratory experiment led to the conclusion that the hourly variation in the number of industrial accidents was due to rate of work and not to fatigue. (19)

TEMPERATURE

In fine linen weaving the economic limit of temperature is reached when the wet bulb temperature exceeds 73° F. Beyond this limit efficiency falls owing to the discomfort and fatigue of the workers. (20)

The cooling power of the air in coal mines, as measured by the kathermometer, was found to be directly related to rate of production and inversely to the rest pauses taken by the colliers. Taking the rate of production at the highest cooling power as 100, the rate fell to 74 at the lowest cooling power, whilst voluntary rests rose from 4.6 minutes to 10.6 minutes per hour. The accident rate for colliers was also related to ventilation and the cooling power of the air. (39)

BOREDOM

A dictionary defines boredom as 'weariness' and indeed it may be regarded as a particular form of mental fatigue. There is little doubt that boredom reduces motivation to work and robs the sufferer of energy. However, the state is not the same as that of ordinary fatigue, for if a bored person is given an interesting occupation he is immediately full of energy and can tackle it with gusto, *i.e.*, there is no accumulation of fatigue products in the ordinary sense.

In a survey of workers on repetitive work it was established that only 3%

showed no symptoms of boredom; 33% were slightly affected, 38% moderately, 23% severely and 3% were seldom free. (77) Boredom is most common at the middle of a working spell. (63) (77) Relief may be obtained to some extent by talking, singing and day-dreaming; 'music while you work' was also found to be a useful palliative. The amount of boredom experienced was found to be associated with certain personal characteristics such as intelligence (the more intelligent suffer more), inability to mechanise simple manual processes, extrovertive tendencies and a desire for creative rather than repetitive work. Some of these qualities may be detected by suitable tests, so that selection of workers for boring and monotonous jobs may be possible. (77)

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2. The Output of Women Workers in relation to Hours of Work in Shell-making. By ETHEL E. OSBORNE. 1919.
3. A Study of Improved Methods in an Iron Foundry. By C. S. MYERS. 1919.
5. Fatigue and Efficiency in the Iron and Steel Industry. By H. M. VERNON. 1920.
6. The Speed of Adaptation of Output to Altered Hours of Work. By H. M. VERNON. 1920.
8. Some Observations on Bobbin Winding. By S. WYATT and H. C. WESTON. 1920.
9. A Study of Output in Silk Weaving during the Winter Months. By P. M. ELTON. 1920.
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40. The Effect of Eyestrain on the Output of Linkers in the Hosiery Industry. By H. C. WESTON and S. ADAMS. 1927.

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Attitudes to the Employability of Chronic Schizophrenic Patients

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IN a recent experiment, in which 20 long-hospitalised schizophrenic patients attended the local Industrial Rehabilitation Unit, a major factor determining outcome appeared to be the change in attitude of the patients towards work. A beneficial change occurred in 10 moderately-ill patients, but the remaining subjects were limited by their severe handicaps and did not show much improvement in this respect. The adoption of a more definite and realistic attitude by most of the moderately-handicapped patients was thought to be due to several factors, three of which would be difficult to replicate unless the facilities provided by the I.R.U. were available. Firstly, the patient was given an opportunity to demonstrate his working ability to himself, and to the hospital and I.R.U. staff. Secondly, there was a realistic industrial setting, with a majority of non-schizophrenic and non-institutionalised workers. Thirdly, there was a deliberate policy of establishing a normal working routine. The Unit staff did not know quite what to expect of the patients before they arrived, and no high expectations were held out by the hospital staff. The changes in attitude on the part of the staff and the patients were thought to be mutually reinforcing (Wing and Giddens, 1959).

There is little published work on the systematic documentation of changes in attitude of staff during the treatment or rehabilitation of disabled persons, though there is a strong clinical impression that such attitudes may be important—and occasionally decisive—in influencing the eventual outcome. The descriptive phrases used at the first and final senior staff conferences about each patient were therefore recorded and analysed. No direct change in behaviour was described at these conferences in respect of any patient. However, there was a shift in emphasis, from derogatory remarks at the first conference, to positive descriptions at the final conference. This change was marked and significant in respect of the 10 moderately-handicapped patients, but small and insignificant in respect of the 10 severely-handicapped. Thus, at the first conference, both groups were adversely commented upon, while at the last there was a discrimination in favour of the moderately-handicapped. These findings could, at least in part, be explained in terms of a change in attitude on the part of the senior staff (Wing, 1960).

If such a change had, in fact, taken place, the attitude of the staff who had dealt with this group should be more favourable to the employment of schizophrenic patients than the attitude taken up by the staff at other I.R.U.s or establishments for rehabilitating disabled persons (for example, Government Training Centres). This gave a further opportunity to check an important hypothesis. An attitude questionnaire was therefore designed and administered to various samples of I.R.U. and G.T.C. staff.

PREPARATION OF THE QUESTIONNAIRE

A schedule of 12 items was prepared (see Appendix). Since no specific examples are given, the answers are likely to relate to a composite stereotype depending on what experience the respondent has had and on his prejudices. It has been demonstrated (Bass, 1955; Chapman and Bock, 1958) that respondents tend to agree with the statements submitted to them, and that there is a strong tendency to answer in the direction which appears to be most socially acceptable in the administrative context. Six items were therefore worded positively (2, 4, 6, 8, 10, 12: subtotal P) and six negatively (1, 3, 5, 7, 9, 11: subtotal N), on the hypothesis that subscore P would be significantly more favourable than subscore N. It was proposed to use only subscore N as a measure of attitude since respondents would have to disagree with the statements in order to express a favourable attitude. The factor of 'acquiescence' would thus be avoided and that of 'social desirability' reduced. The items were scored 1-7, a higher score indicating a more favourable attitude.

In addition, four of the items referred to patients who still had symptoms (1, 4, 7, 10: subtotal A), four referred to patients who were symptom-free (2, 5, 8, 11: subtotal C) and the remaining four included no comment as to whether the patient showed symptoms of the illness or not (3, 6, 9, 12: subtotal B). In each set of four items, two were worded positively and two negatively. It was predicted that these subscores would be significantly different from each other, and would always be in the same rank order (A, B, C, with subtotal C greatest).

PRELIMINARY ANALYSIS

A sample of 75 Disablement Resettlement Officers in South-Eastern England completed the questionnaire, through the courtesy of the London Regional Office of the Ministry of Labour. The consistency of subscores N and P was tested by a method similar to the one proposed by Edwards (1957). The mean score on each of the 6 negative items was calculated for the 25 highest and 25 lowest scorers on subtotal N, and the significance of the differences obtained by t-tests. The same procedure was used for the 6 positive items, using the 25 highest and 25 lowest scorers on subtotal P. The results are set out in Table 1, from which it is apparent that the criterion groups have significantly different scores on each item except number 12, to which nearly everyone agreed.

TABLE 1: SIGNIFICANCE OF THE DIFFERENCE BETWEEN
CRITERION GROUPS ON EACH OF THE 12 ITEMS

CRITERION GROUP 25 HIGHEST AND 25 LOWEST SCORERS ON					
SUBTOTAL N			SUBTOTAL P		
Item	t	p	Item	t	p
1	5.46	<.001	2	5.96	<.001
3	11.33	<.001	4	10.06	<.001
5	8.21	<.001	6	6.46	<.001
7	5.41	<.001	8	7.28	<.001
9	3.15	<.01	10	5.36	<.001
11	5.31	<.001	12	1.41	>.10

Since it was not proposed to use subtotal P to test the hypothesis, no further manipulation was required. The N subscore (23.00 ± 7.79) and the P subscore (30.61 ± 6.85) were significantly different ($t = 6.34$, $p = <.001$). The A, B and C subscores (15.73 , 18.33 , 19.55) were also significantly different from each other ($F = 9.67$, $p = <.001$) and in the predicted rank order. It was therefore considered that the questionnaire, if reliable, was suitable for testing the hypothesis that members of the staff at the experimental I.R.U. were more favourable in their attitudes to the employability of schizophrenic patients than those at other I.R.U.s or at a Government Training Centre.

PROCEDURE

The schedules were administered to 15 occupational supervisors from I.R.U.s all over England, while they were on a course at the experimental I.R.U. Eleven staff at the experimental I.R.U. and 20 instructors at the adjacent Government Training Centre were also asked to complete the schedule. Each respondent sealed the form in an envelope addressed to the investigator. No one declined to give an opinion, but three did not sign their names.

In each sample, subtotals A, B and C were in the predicted rank order.

RELIABILITY

Twenty-three of the staff at the experimental I.R.U. and at the G.T.C. were interviewed within a fortnight of completing the schedules, by a sociologist, Mr G. W. Brown, who then rated their attitudes towards the employability of schizophrenic patients with residual symptoms, and towards those who had recovered. Each attitude was rated on a 4-point scale and the two ratings summed. These scores were correlated with the total score on the questionnaire ($r = +0.56$, $p = <.01$). Two supervisors had attitudes, as rated at interview, which were markedly opposed to their attitudes as measured by the questionnaire. One was more favourable at interview, the other more favourable in his responses to the questionnaire. When these two were omitted, the correlation became $+0.80$. It is thought that this order of reliability is as high as can be achieved, and is satisfactory for the purpose.

In order to check on the extent to which the attitude as measured by the N-subscore was reflected in the behaviour of the supervisors, the Rehabilitation Officer of the experimental I.R.U. was asked to place the 11 supervisors in rank order according to his estimate of their helpfulness to the chronic schizophrenic patients who passed through their sections. The rank order correlation coefficient was $+0.61$ ($t = 2.31$, $df = 9$, p , two-tailed, $= <.05$). Thus the attitude as measured by the N subscore was significantly related to the helpfulness shown in behaviour. On the other hand, the attitude measured by the P subscore was actually negatively related to the Rehabilitation Officer's ranking of behaviour ($\rho = -0.37$).

though the degree of association was not statistically significant. When the discrepancies between the two subscores were ranked, there was a correlation of $+0.89$ with the Rehabilitation Officer's estimate of behaviour. Those supervisors who showed least discrepancy between subscores were assessed by the Rehabilitation Officer as being most helpful to the patients.

RESULTS

The mean subtotals, for each of the three groups, are set out in Table 2. A 2×3 analysis of variance disclosed a significant difference between groups and between subscores N and P. An analysis of variance of the N subscores only, gives a significant overall difference ($F = 8.44$, $p = <.001$), and subsequent t-tests show a significant difference between mean scores for the experimental I.R.U. and for other I.R.U.s ($t = 2.27$, $p = <.05$) and between mean scores for other I.R.U.s and for the G.T.C. ($t = 2.19$, $p = <.05$).

TABLE 2: MEAN SUBSCORES, ON ATTITUDE QUESTIONNAIRE, OF THREE GROUPS OF STAFF

GROUP	MEAN SUBSCORES	
	6 NEGATIVE ITEMS	6 POSITIVE ITEMS
Experimental I.R.U. ..	31.00	36.19
Other I.R.U.'s.	25.13	36.27
G.T.C.	19.45	29.95

DISCUSSION

The hypothesis was that there would be differences in attitude score between I.R.U. staff members who had had experience of an experimental series of chronic schizophrenics and staff members of other I.R.U.s or G.T.C.s who had not. This hypothesis was derived in the first place from clinical observation and in the second place from a systematic analysis of descriptive observations made by senior staff at the first and final case conferences at the experimental I.R.U. The assumption was also made that the scores do in fact represent attitudes to the employability of chronic schizophrenics, and there is good evidence for this. The hypothesis was not falsified although it was tested in a situation where it might well have been shown to be wrong.

The evidence presented is cross-sectional. There appear to be differences in attitude between the three groups studied, but a longitudinal process of change in attitude in the supervisors of the experimental I.R.U. has not been demonstrated. Such a process may, however, be reasonably inferred. It may also be assumed, though rather more tentatively, that the change in staff attitudes was beneficial, since the Rehabilitation Officer considered the supervisors with the most favourable attitudes to be those who helped the patients most. Thus the final inference, that a similar change of attitude

on the part of the staff of other units would also be beneficial, can be made with a certain amount of confidence. However, these interpretations should be looked upon rather as hypotheses to be made the basis of future experimentation, than as definite administrative conclusions.

The significant difference between scores derived from negatively and positively worded items is in accordance with expectation. It is interesting to note, however, that the prediction of a more favourable attitude in the experimental I.R.U. staff members compared with occupational supervisors from other I.R.U.s, holds only for the subtotal derived from the negatively worded items. There is no difference on the positive subtotal. The latter group of supervisors completed the questionnaire at the end of a fortnight's refresher course at the experimental I.R.U., during which they had been exposed to a climate of opinion relatively more favourable to chronic schizophrenics than their own. When faced with positively worded items they tended to acquiesce in what they perceived would be a socially acceptable attitude, but they were not equally willing to disagree with negatively worded items. This suggests that their overall favourable attitude was not a stable one. The G.T.C. supervisors showed the same large discrepancy between subtotals but at a more unfavourable level on both scores. The experimental I.R.U. supervisors showed least discrepancy between subscores. However, even among supervisors at the experimental I.R.U. there was considerable variation in the degree of discrepancy. It is quite plain, from the Rehabilitation Officer's assessments, that those with the greatest discrepancy in attitude were those who helped the patients least.

From observations made at the experimental I.R.U., and from discussions with the Rehabilitation Officer there, it may be suggested that the beneficial change in attitude was largely brought about by the interaction of two important factors. In the first place the chronic schizophrenic patients were very carefully selected. They were, for the most part, cooperative and willing, even though they showed typical behaviour traits such as lack of initiative, a reserved manner, and slowness to learn. Many were severely handicapped, some showed delusions and hallucinations and odd behaviour, but none was objectionable or markedly socially embarrassing. In the second place, psychiatric advice was always readily available—not only at case conferences with senior staff, but on the workshop floor. It is evident that I.R.U. staff are very willing to undertake this kind of work if they feel that they are backed up by the medical authorities concerned, who retain full medical responsibility and are ready with immediate advice and help when the staff most want it. The psychiatrists from the mental hospitals concerned are familiar figures at the experimental I.R.U. and it is in large measure due to the excellent understanding between them and all grades of I.R.U. staff that these experiments have achieved a measure of success.

The present results are therefore consistent with the previous findings, and they can be interpreted in a satisfactory manner. They provide a small

link in the chain of evidence needed for a theory of rehabilitation.

SUMMARY

The results of previous work suggested that there was a favourable change in attitude of I.R.U. staff towards the employability of chronic schizophrenic patients, as a result of their supervision of a carefully selected series of 20 such individuals. It was therefore hypothesised that supervisors at the experimental I.R.U. would have more favourable attitudes than those in other rehabilitation establishments. An attitude questionnaire was constructed which yielded two scores—based respectively on negatively and positively worded items. The positive score was consistently higher than the negative, for all groups tested. In preliminary work, the scores were found to be consistent and reasonably reliable, and significantly related to the degree of helpfulness that occupational supervisors showed towards schizophrenics. It was found, in accordance with prediction, that the experimental I.R.U. staff had more favourable attitudes, and that there was less discrepancy between their responses to the negative and positive items than in two other groups.

ACKNOWLEDGMENTS

I am greatly in the debt of a large number of officers of the Ministry of Labour who willingly cooperated in this work, particularly Mr J. M. Murray and Mr W. J. Hull of the London Regional Office. Mr R. G. T. Giddens has always been most generous with help, encouragement and counsel. My colleague, Mr G. W. Brown, undertook the reliability study.

APPENDIX

This is a list of statements which people sometimes make about patients who suffer, or have suffered, from the mental illness known as schizophrenia. All the statements refer to patients who have spent some time in a mental hospital.

Will you please indicate whether you agree or disagree with each of the statements by placing a tick in the appropriate column. There are no "right" or "wrong" answers: what is wanted is an expression of the opinion you hold, in the light of your experience. So please be perfectly frank.

All answers will be treated in strict confidence, and will be seen by no one except members of the unit carrying out the study.

1. If they have any mental symptoms they ought to be in hospital.
2. I would have no objection to employing one if the doctor said he was well.
3. They are much too unrealistic and unreliable to make good employees.
4. Some of them can do responsible jobs even though they haven't recovered completely.
5. I would never recommend one strongly to an employer, even if he was comparatively well.

6. Though it may be necessary to work harder to get them employment, the effort is well worth while.
7. If they have any symptoms they need close supervision and restraint.
8. They can do a job as well as the next man once they have recovered.
9. They should not be allowed to do a job which takes them into people's homes.
10. Even if they have mental symptoms they can sometimes do a good job to the satisfaction of an employer.
11. They are only suitable for low grade jobs even when well.
12. It is difficult to say anything about them as a group, they vary so much.

(Each statement could be ticked in one of 7 columns according to whether the respondent strongly, moderately or slightly agreed, could not say, or slightly, moderately or strongly disagreed.)

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The Psychologist's Role in the Development of Man-Machine Systems

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SYSTEMS AND SYSTEMS DESIGN

A SYSTEM may be defined for our present purpose as any organised group of activities, involving men and machines, directed towards the solution of a given problem or set of problems. (16) A system can be analysed into a set of interacting sub-systems each one of which contributes to the overall effectiveness of the system. (6) Systems design, or systems engineering, is the attempt to achieve, through effective utilisation of the capabilities of both men and machines, optimal system performance towards the achievement of the stated objectives. (4, 14)

Early approaches to the design of man-machine systems were, inevitably, 'machine-centred'. Machines were devised to extend the range, power, speed or precision of the human operator; and, with every increase in the complexity of the machine, with every extension of mechanical techniques into new spheres of operation, the human operator became more nearly peripheral to the activity in which he was concerned. In many cases the objective of the man-machine system was one of such urgency that newly-developed equipments were rushed into service without taking into consideration the demands made on the human operator; he simply had to adapt to the new equipment, *e.g.*, the use of radar for aircraft detection and control during the World War of 1939-45 created many problems for the human operator (2). The machine-centred approach to system design led to elaborate programmes of personnel selection and training ('fitting the man to the job') with a view to finding the right man for a particular job. The job itself was dictated by the machine which was available and by fitting the operator to the demands of existing equipment, output was increased and waste was reduced. (17)

The natural development of automation in modern equipment freed the human operator from many manual tasks, limiting his activities to those which could not be performed by machines, either for reasons of cost or because the appropriate techniques had not been developed. At the same time, the limits of human error which any given system could tolerate were considerably narrowed because of the inability of an extremely complex man-machine system to tolerate wide fluctuations in the performance of individual components in the system. Man, as a component in the system, was forced to work with greater consistency and accuracy, using more complex equipment than before.

Much of this new equipment was inadvertently designed in such a way

that personnel could not perform their operating or maintenance tasks easily, quickly and without undue fatigue or error. Consequently the 'man-centred' approach which aimed at the design of systems and system components which were compatible with the limitations of the human beings who had to work them, emerged ('fitting the job to the man').

Much of the effort of the 'human engineers' who adopted this approach was directed to criticising existing equipment designs and existing systems because of the unreasonable demands they made on the human operator. This line of action, although at first not welcomed by the engineering industry and in many ways wasteful because of the expensive design modifications recommended, was certainly profitable in the long run. One outcome was to throw into prominence some of the more sensational blind spots of the design engineers. As many sceptics became convinced of the value of human engineering, it led also to the emphasis now placed on proper vetting of new equipment by engineering psychologists. The outstanding application of the 'man-centred' approach has, of course, been in the armed services, in such fields as cockpit design for aircraft (8, 9) and crew situations in submarines (1) where a large number of complicated displays and controls must be readily available to a single operator in a very restricted space.

In recent years there has been an increasing tendency to regard both man and machine as part of an overall design. Instead of selecting the man for the machine or designing the machine round the man, each component is planned for the system and the objective which it is to accomplish (fitting the man and the job to the system). The 'system-centred' design is concerned primarily with realising a stated operational objective with the maximum economy of time and money.

Before any consideration is given to the actual pieces of equipment which will be required, or to the tasks of human operators in the system, the conditions under which the system will be required to work must be laid down. When this has been done a design team can then examine in detail possible methods of accomplishing each sub-objective and decide which operations can best be carried out by machines and which ones utilise to the full the particular skills and abilities of the human operator. In this process it is often convenient to think of the human operator as if he were a system component in the same way as an amplifier, computer or other machine; that is, as an item subject to stresses and breakdowns, with capabilities and limitations.

It may readily be seen that in the 'system-centred' design full advantage is taken of the procedures developed by 'machine-centred' and 'man-centred' systems. Once the tasks of the human operator in the system have been defined, elaborate programmes of selection and training may be undertaken with advantage. Similarly, once those operations which involve machines have been defined, equipment designs may be engineered to make full allowance for the characteristics of the operators who are to work them.

If these steps are taken in the right order, then the final system will not be a patchwork of compromise and revision, time and money will not be wasted in expensive programmes of re-engineering and situations which might lead to low morale and poor motivation of personnel will be avoided.

THE SYSTEM DESIGN TEAM

A system-centred approach to the design of any man-machine system requires that the design team should consist of representatives from three main fields of specialised knowledge.

- (a) User Representatives, familiar with current problems and present methods of solution, able to forecast the required levels of performance of the system under design.
- (b) Design Engineers and Scientists, fully acquainted with the techniques at present available, the delivery dates and costs of specific equipments and the current trend of technological developments.
- (c) Human Factors Representatives, with psychological training and a specialised knowledge of human engineering, selection and training problems and techniques, and methods of measuring the performance of human operators.

STAGES OF SYSTEMS DESIGN

The first step towards the design of a man-machine system is the stating of an 'operational requirement' which lays down in broad terms the objectives of the system, the time period during which it is designed to operate, and the limitations which can be accepted.

Once this requirement has been stated the design team can start on detailed planning. The design team will normally work in four stages:

- (a) The distribution of tasks between men and machines must be decided. It has been popular practice to refer to Manual, Semi-Automatic and Fully-Automatic systems, according to the degree of dependence on the human operator, but it will readily be seen that these are unfortunate terms; no system can be entirely manual and no system can be fully automatic in the sense that no human operator is involved in its working. It is obvious that only a detailed consideration of each task will determine whether it is better to assign it to a man or to a machine. A doctrinaire insistence that 'we must retain the flexibility which only a human operator can give' or alternatively 'we cannot afford the fallibility of the human operator' is almost certain to lead to an inappropriate allocation of tasks.
- (b) Planning the detailed application of the principles of task allocation which have been decided. There are three sub-stages:
 - (i) Design of equipment.
 - (ii) Layout of equipment and working conditions for maximum efficiency.
 - (iii) Devising working procedures for the sub-systems which together make up the main system.

At each of these sub-stages it may be necessary to run comparative experiments to decide on the merits of alternative solutions to design problems.

- (c) Evaluation of the equipment design and working procedures must be carried out, usually by methods of simulation (10), in order that gross errors and difficulties may be ironed-out at an early stage. This may result in recommendations for the re-design of equipment, revision of working procedures or recommendations on the selection and training of operators to ensure that personnel of suitable ability and skills will be available.
- (d) Trials of the system in operation should, if possible, be carried out before it is too late to make any changes in the design. The overall performance of the system should be studied under conditions likely to be encountered in practice.

THE PSYCHOLOGIST AS MEMBER OF THE DESIGN TEAM

The special responsibilities of the psychologist in the design team can be dealt with under four separate headings.

- (a) Recruitment, selection and training. The psychologist will be able to advise on the feasibility of selection and allocation programmes for the special tasks involved in the system and training programmes aimed at making the best possible use of available man-power. The psychologist should also be able to advise on career structures so that workers of the right calibre can be attracted and retained. Particular care must be paid to the number and duties of supervisors in the system.
- (b) Human Engineering data. The psychologist will be the only member of the design team with ready access to detailed information on such topics as arm-reach for the average operator, optimum control forces which can be exerted in different directions from different working positions, and optimum dimensions for different equipment.
- (c) Physical factors affecting the human operator. Foremost among these will be illumination, ventilation and noise. As it is unlikely that any of these features will be so grossly mishandled that actual clinical effects will occur, they are probably better dealt with as factors affecting performance rather than as hazards to health. In all probability the worst effects which appear will be inefficient performance on the more exacting tasks because of bad light, poor ventilation or high noise levels. (11, 12) In many cases it will be possible to warn against such situations in the early design stages; in others it will be necessary to follow up complaints made by operators about difficulties experienced. In such cases it is particularly important to distinguish between legitimate complaints about environmental factors, and complaints which have been transferred to environmental factors because of boring and monotonous tasks or low morale.

- (d) Limits of human performance. The most important contribution of the psychologist is the provision of data on the performance of the human operator in the specific tasks which are assigned to him under the system. Such questions as the information capacity of the human operator in a given situation, or the information required before a certain type of decision can be made, or the optimum work load for a given type of task can all be approached in the first instance through basic psychological theory. In almost all cases it will be necessary to supplement the data available in the psychological literature and in the various designers' handbooks (13, 15) by means of controlled experiments (10, 12) using situations specific to the system under study, but a good knowledge of previous work can reduce enormously the number of experiments required. It is the task of the psychologist to devise, conduct and interpret such experiments.

During the final evaluation of the system under operational conditions, the psychologist must again be responsible for the measurement of human performance to validate or revise the predictions previously made. The results of comparative trials should be expressed in terms of the contribution made to the effectiveness of the system. Statistical significance must be translated into operational significance.

In order that maximum use may be made of his specialised knowledge it is essential that the psychologist should be able to communicate his views to the other members of the design team in an intelligible form. The use of concepts from the physical sciences and machine analogies for the quantification and description of human behaviour will often facilitate the comparison of human performance and machine performance. The ideal at which to aim is that designers should be able to consult tables of normative data covering all aspects of human performance, expressed in terms which do not require translation by a specialist before they are of use to the designer. (7)

One reason for the unique contribution of the psychologist to systems design is the central position which is held by psychology among the biological sciences. To a greater extent than the physiologist, anthropologist or sociologist, for example, he can provide a balanced treatment of human operator problems. There is a risk, however, that his broad range of special knowledge and skills can lead to an over-ambitious attempt to be a universal expert. It should not be assumed, either by the psychologist himself or by other members of the design team that because he can point out a disadvantage in some proposed procedure or equipment he can also provide the engineering or organisational solution to the problem. The role of the psychologist may be often one of criticism rather than construction.

The psychologist as a member of the design team is an adviser on human factors; he must not set himself up as a champion of the human operator against the demands of the machine. There are many tasks which machines can perform better than men (3, 16) and it is the special responsibility of

the psychologist to recognise the limitations as well as the unique capabilities of the human operator.

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A Validation of Qualification Requirements for work in a USAF Specialty*

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SELDOM does one find, in the literature covering research on occupations, validation of explicit information of the kind found in qualifications statements which accompany job descriptions. At their worst these formulations may reflect little more than traditional attitudes or popular prejudice as to the qualifications needed for various kinds of jobs. At their best they may mirror the professional judgment of competent occupational analysts, but one does not usually see, for any of them, evidence that the particular requirements have been checked against some criterion of proficiency. The problem of this investigation was to determine the utility of selected education, experience, aptitude, and training variables in predicting a measure of job knowledge for a sample of United States Air Force mechanics specializing in the maintenance of a heavy bomber aircraft.

PROCEDURE

The list of thirty-one predictor variables examined in the course of this investigation was derived, in part, from official Air Force documents giving the mandatory and desirable qualifications for the aircraft mechanic specialty (D.A.F., 1956). In part, however, the list included additional variables presumably related to the criterion of proficiency used. The Mechanical Aptitude Index, the measure of mechanical aptitude used as one of the predictors, was obtained through the use of the Airman Classification Battery (Brokaw and Burgess, 1957).

The criterion measure adopted for this study was total score obtained on a 230-item proficiency examination developed for the Air Force by Human Factors, Incorporated (Buckner, 1956). The Kuder-Richardson Formula 21 reliability of this instrument was found to be .96, based upon the performance of the subjects of the present study. A claim of content validity has been set forth for this examination since the examination outline called for need-to-know items as judged by experienced mechanics and engineers. The highly structured work situation in the Air Force, covered by detailed procedural publications which are completely authoritative, readily lends itself to the application of the principle of content validity in test construction and in the interpretation of test results. The examination accepted in this investigation as the criterion of proficiency is currently being used by the

*The research reported here was carried out under ARDC Project 7734, Task 17018, and is based on Technical Note WADC-TN-59-40.

Strategic Air Command to ascertain the specific training needs of B-52 maintenance personnel. Shorter and more general examinations of a similar type, the Airman Proficiency tests, are routinely used by the Air Force, as an aid in determining skill-level classification (Gilhooly, 1956).

The subjects of this investigation consisted of 415 aircraft mechanics working at the "5" level* of skill (about 90 per cent of such men on daytime duty rosters in the first three Strategic Air Command wings to be equipped with B-52 aircraft). The average man in this group had been in the Air Force for about three years and had completed the eleventh grade before entering the Air Force. He had completed at least two Air Force technical school courses, one a general or basic course in aircraft maintenance and inspection, and one a specialized course of B-52 aircraft. He had, on the average, spent a little more than two years working on the "line" as a mechanic, most of it on bomber aircraft.

An iterative technique for multiple-correlation analysis, as outlined by Greenberger and Ward (1956), was used as the statistical procedure for treating the data assembled for this study. In one portion of the computations, squared correlation coefficients or squared multiple-correlation coefficients were obtained, using only one kind or category of information at a time in the separate regression equations. These r^2 or R^2 values were taken as estimations of the proportion of criterion variance for which we would be able to account were we limited to only one kind of information about the subjects. Since we generally have, in the practical situation, more than just one kind of pertinent information about such people, these values are taken to represent maximum values (gross contributions) which can be associated with the kinds of predictors considered.

In another portion of the analysis a squared multiple-correlation coefficient was computed giving *all* variables studied a chance to contribute to the multiple R^2 during the course of several iterations (as many as 22; when there was no change in the third decimal place of the squared multiple-correlation coefficient, the iterative procedure was stopped). This coefficient was then recomputed omitting, in turn, each kind of variable represented on the total list. Difference in this obtained values (using all variable versus all except one kind) was taken as an estimation of the proportion of variation in the criterion measure which each type of predictor variable can add to the proportion attributable to all the others. This difference is referred to in this report as the *unique contribution* to distinguish it from the *gross contribution* obtained when considering the role of each kind of variable without reference to the others. In testing the significance of the estimates of the proportion of criterion variance attributable to the action of the predictor variables under the two computational conditions, the conventional variance ratio F was used.

*Among aircraft maintenance personnel in the Air Force, a code of "3" identifies an apprentice or semi-skilled mechanic, a code of "5" identifies a skilled mechanic, and a code of "7" identifies a maintenance technician at the highest level of skill.

RESULTS

A brief examination of Table 1 will show that the kind of variables studied can be divided into three larger groups in terms of the pattern of their contributions to criterion variance. One of these groups consists of

TABLE 1: PROPORTION OF VARIANCE IN PROFICIENCY TEST SCORES
ATTRIBUTABLE TO THE ACTION OF SELECTED KINDS OF PREDICTOR VARIABLES

(N=415 B-52 Mechanics)

KIND OF PREDICTOR	GROSS CONTRIBUTION		UNIQUE CONTRIBUTION		F ₀₁ *
	PROPORTION	F	PROPORTION	F	
Air Force Maintenance Experience	24.4%	21.9	11.7%	12.8	2.8
Mechanical Aptitude Index (ACB)	8.3%	37.3	4.2%	27.4	6.7
Air Force Courses on B-52 Equipment	13.7%	32.8	4.8%	15.9	4.7
Other Air Force Technical Courses	5.0%	7.2	.6%	1.4	3.8
Months in Air Force (Total)	11.2%	51.9	.0%	—	6.7
Years Education (Total)	2.9%	12.3	.0%	—	6.7
High School Graduate (Yes, No)	2.8%	11.9	.0%	—	6.7
Science Courses in High School	1.8%	2.5	.4%	.8	3.8
Mathematics Courses in High School	2.8%	2.3	.4%	.5	3.1
Industrial Courses in High School	1.1%	.6	.6%	.5	2.5

* The exact value for F₀₁ is slightly different for testing the significance of the two F's reported in each line, but this difference occurs in the second and third decimal places.

variables which function fairly well as predictors when they are taken separately. In this circumstance they enable us to predict a statistically significant proportion of variance in criterion scores. When considered with certain other information on the subjects, however, these particular variables are seen to make no unique contribution to the prediction. Included are two measures of education level (total years education and dichotomous variable on high school graduation); total number of months in the Air Force; and months in Air Force technical school courses other than in courses on B-52 equipment.

A second group of entries in Table 1 consists of kinds of predictors which make no statistically significant contribution toward the prediction of criterion variance when taken alone; neither do they have anything to add to the contribution of the other variables listed. Included in this group are the kinds of variables described by the entries: science courses in high school (general science, physics, and chemistry); mathematics courses in high school (high school arithmetic, algebra I, algebra II, geometry, and trigonometry); and industrial arts courses in high school (mechanical drawing, wood shop, metal shop, welding, machine shop, automobile mechanics, electrical shop, and shop mathematics).

A third group of entries in Table 1 consists of kinds of variables which function not only when considered separately, but also make a statistically significant contribution to criterion variance over and above that of all the

other variables studied. Included in this group are the kinds of predictors described as: Air Force maintenance experience (months on six different types of aircraft); the Mechanical Aptitude Index; and months in Air Force courses on B-52 equipment.

DISCUSSION

The findings of this investigation, in regard to the functioning of education variables, are related to results reported by Tupes and DuBois (1958). Level of education is perhaps a useful bit of information to have about persons entering many occupations, but in the Air Force situation other pertinent information is available on prospective populations and the total amount of information accumulates rapidly in the course of military service. In the light of the findings reported here it may be that qualifications statements should not generally contain references to educational level. In the present context this information is in the same class with variables such as "total time in the Air Force". If we know nothing else about a particular person, knowing how long he has been in the Air Force will enable us to predict a significant proportion of the variance in one criterion of proficiency. This information makes no contribution above that available from other predictors, however, and one feels that it may be somewhat more useful to know how the individual has spent his time in the service.

The itemization of particular high school subjects in qualifications statements is, in view of the results of this investigation, perhaps somewhat less tenable than specification of education level. This is not to say, however, that knowledge in certain academic areas may be irrelevant to the prediction of a criterion of proficiency such as the one used in this study, or that the completion of certain courses would not help in the prediction of some other criterion. It does say, however, that the mere circumstance of having had or not having had particular courses in high school appears to be a relatively unimportant piece of information when it comes to explaining the variance associated with the criterion of proficiency used in this investigation.

In the present study the only kinds of variables which made a statistically significant contribution to the prediction of the criterion measure, over and above all others listed, were the experience variables, the variables having to do with specific training on the equipment inspected and maintained by the subjects, and the Mechanical Aptitude Index. These were precisely the kinds of measures which functioned exceedingly well as separate predictors. Since these were also the variables on which prior screening of the subjects is most likely to have occurred, the reported criterion relationships are probably conservative estimates of those which would be obtained for an unselected group.

SUMMARY

The problem of this investigation was to determine the utility of selected education, experience, aptitude, and training variables in predicting a measure of job knowledge. The subjects were 415 Air Force mechanics

specializing in the maintenance of a heavy bomber aircraft. Using multiple regression techniques, three groups of variables were evaluated for their predictive power. A group composed of specific high school courses showed no relationship to the criterion. A second group (education level, time in the Air Force, and Air Force training courses not specific to the equipment maintained) were individually predictive of the criterion, but added nothing to the prediction from a composite of the other variables. A third group (Mechanical Aptitude Index, Air Force training courses specific to the equipment maintained, and Air Force maintenance experience) were individually predictive, and in combination with the other qualification variables, added significantly to the composite prediction.

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A Note on Skill

By B. N. KNAPP

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INTRODUCTION

THERE have been many different views on the nature of skill. Pear (1924) defined skill as an organisation and integration, for the most part, of bodily habits. Guthrie (1952) writes that 'skills are made up of habits, but habits stand in the way of skill as well as being the stuff of which skills are composed. Progress in skill is the formation of "good" habits and the elimination of "bad" habits'. Oldfield (1952) on the other hand states that 'there are marked differences between habits and skills' for 'what we learn at tennis is not a set of strokes but how to make strokes appropriate to the moment'. It would seem to be time to consider if a synthesis of these views is possible.

THE MOTOR AND PERCEPTUAL ASPECTS OF SKILLS

The first point which should be made is that skill is a blanket term covering a multitude of different kinds of act. For instance, the following widely differing actions have been used in experiments into motor skill: tracing figures, tracking, throwing at a target, grid-position matching (all by Welford, 1951), operating a capstan-lathe (Seymour, 1954 and 1955), assembling and wiring an electric lamp-holder (Cox, 1934), bomb-aiming and the flying of aeroplanes (Bartlett, 1947). Many writers have also quoted examples from athletic skills such as cricket, golf and lawn tennis.

The earlier psychologists tended to concentrate their attention on the response or effector processes and thus to stress those parts of a skill which were predominantly motor. More recently psychologists, especially those of the Cambridge School, have turned their attention to the input side of skills or receptor processes and particularly to the display and the part played by perception.

It is likely that performance which can be called skilled possesses common characteristics such as those outlined by Welford (1951) but it would appear that the exteroceptor, proprioceptor and effector processes are not of similar importance in the contribution which they make to any particular skill. More specifically it is difficult to agree with Bartlett (1947) when he suggests that the receptor functions are particularly identified with the distance receptors in all skilled behaviour.

Suppose we examine the skill of shot-putting. Here the best performer in theory will be the one who has the best style mechanically speaking, who can produce most power and who can perform this best style under any circumstances. Thus the best performers will tend to be those who can ignore the signals arising from the external environment. The learner will therefore spend his time first on building up a pattern of movement which is as close to the theoretical best for his build as possible and then on practising this so that it will become virtually a habit. From then on any

improvement will be made by increasing the strength and applied power of the performer. Perhaps some psychologists would not call shot-putting a skill but the 'man in the street' certainly would.

There may possibly be criticism of this view from shot-putters who might argue that a strong wind or a varying surface may have to be taken into account. Theoretically however these will affect the athletes in a similar way and in any case are of exceedingly small importance so far as this particular skill is concerned. The other difficulty inherent in all discussion on highly complex skills is that a person has never attained perfection and thus skill is not static but is continually being changed in an attempt to better it. Nevertheless it would appear that in competition it is the pattern of movement involved in the bodily skill of shot-putting which is all-important and that therefore the nearer this is to a mechanically perfect habit the better.

If however a skill such as the playing of association football is considered other factors become important. In this game an individual may have good patterns of movement but if he does not do the right action at the right moment he is almost useless as a player. Thus here it is the insight into the display which is of major importance. The need here as Bartlett (1947) says is for the performer to be 'in touch with demands which come from the outside world' and thus the messages from the distance receptors and their interpretation become vital. It would seem necessary therefore for the learner in this case to pay more attention to perceptual learning and to understanding the important signals in the display.

Other complex skills may lie somewhere between the above in the relative importance of the various factors. Running 100 yards would seem to be near to shot-putting in that if the necessary pattern of movements can be produced habitually on the sound of the starter's gun, winning or losing will depend on the relative merits in terms of the mechanical and physical advantages of the individual concerned. In this skill, in that of shot-putting and also in the case of some gymnastic skills, it is difficult to agree with Oldfield (1952) that 'the effectiveness of the behaviour is dependent on the absence of stereotyping'. The skill of running or swimming a long-distance race may involve tactical considerations and so perceptual aspects depending on distance receptors begin to have some importance though not so much as in team games where adaptability to the external environment must be of a high order.

A CONTINUUM

The view is therefore put forward that there is a continuum from skills which are predominantly habitual through to skills which are predominantly perceptual. At one end of the continuum are skills in which 'conformity to a prescribed standard sequence of motor acts' (Oldfield, 1952) is all-important and at the other are skills in which 'at every instant the motor activity must be regulated by and appropriate to the external situation' (Oldfield, 1952) and in which the correct interpretation of messages from the distance receptors is vital. In between lie skills at various places

along the continuum depending on the relative importance in the perfected skill of habitual and perceptual aspects.

If this idea is a valid one, then it is important for the researcher into skill, the learner and the instructor to decide where the particular skill with which he is concerned lies on this continuum for this will determine the relative importance which he must attach to the various factors.

This decision will often be a difficult one to make and may not be determinable once for all time. Thus the position of lawn tennis appears to have changed. The perceptual factors which were of great importance seem to be of less significance in the men's game now that the service has become such a dominating influence. By having several services which are mechanically outstanding and which can be produced habitually, an individual can under present conditions on fast courts so dictate the play when he is serving that the possible responses of the opponent are reduced to a small number with which the server can learn to deal in a number of ways. Under these circumstances the patterns of movement and particularly those for the service may become more important than the signals from the external environment.

In industry too changes are occurring which affect the position of particular skills on the continuum. Formerly skilled jobs largely involved manual work of a more or less complicated type which required a fair amount of physical effort. Now as Crossman (1956) points out, 'wherever appreciable physical work is to be done, power from an outside source is employed and the human operator remains merely to direct its application'. There is then a tendency for the accent in industrial skills to be no longer on the motor act but on the perceptual and mental aspects of the task. Many industrial skills have therefore moved along the continuum towards the predominantly perceptual end.

SUMMARY

The view that there is a continuum from skills which are predominantly habitual through to skills which are predominantly perceptual has been put forward and discussed. It is believed that this concept not only helps to bring together the various psychological theories but also that its use might help to clarify some of the hitherto contradictory results from experiments into skill.

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Book Reviews

Sweden's Employment Security Program and its Impact on the Country's Economy.

By CARL G. UHR. California : Institute of Technology, 1960. Pp. vi. + 19. Price \$1.00.

This monograph is published by the Industrial Relations Section of the California Institute of Technology. Recognising that countries with different economic and social settings are likely to approach their problems of unemployment insurance in different ways, the Institute is publishing a series of unemployment insurance studies, of which this is one.

Currently social welfare expenditure in Sweden amounts to over one-third of all government expenditure. The six major items of the social welfare programme are, in order of magnitude : national health insurance and medical care, old age and sickness pensions, family allowance and child care programmes, voluntary unemployment insurance including vocational training, workmen's compensation, which is integrated with the national health insurance scheme, and lastly public assistance. Details are given of the expenditure and the sources from which the revenue is raised. Against the total expenditure on social security, unemployment insurance (or employment security, as the Swedes call it) seems to be a small item, but it is claimed that its influence in social and economic affairs is out of proportion to its amount.

It was at the beginning of this century that the Swedish unions first turned their attention to unemployment insurance. Today the insurance societies are independent of the unions. They are government-subsidised and open to union or non-union members. However, the unions still play an important role in that claims are established through the union and not through a government department.

Rather less than half all workers are members of the Voluntary Unemployment Association, the non-members largely coming from those occupations in which the risk of unemployment is low (e.g., public services).

The conditions which make for eligibility for benefit are set out, and it is of interest to note that a worker discharged for misconduct, who voluntarily gives up his job, who is idle because he is on strike or who refuses suitable employment, is disqualified from benefit for four weeks. Between 1 per cent and 2 per cent of claimants are refused for the last of these reasons, the figure being higher in boom times, when there is confidence in work prospects, than in periods of recession, when the unemployed worker is less likely to be choosy about a job offered to him.

The benefits paid are made up of a basic sum to which may be added supplementary benefits for dependants, but there is some margin of choice for the insured worker who can pay a higher contribution and thus qualify for higher basic benefits. Normally benefits are paid for not more than 35 weeks, after which the claimant is referred to the Public Assistance Programme, whose benefits are likely to be appreciably less. In recent years the Scandinavian countries have adopted a common labour market policy enabling a national of one country to collect the benefits which have been paid for in his own country even when he is working — or falls out of work — in another Scandinavian country.

In the last 10 years the level of unemployment in Sweden has been generally low and the present scheme (designed primarily to cope with short-term unemployment) has adequately met the needs. When there has been relatively high unemployment in some industries accompanied by shortage of labour in others, the Royal Swedish Labour Market Board, created in 1940, attempts to even things out. The Swedish Labour Market Board is similar to the British Ministry of Labour in that it is concerned with the placement of workers. In addition, it can make loans or outright grants to move an unemployed worker to an area where there are vacancies, and in special circumstances can provide prefabricated houses in developing industrial areas in which there is a housing shortage. The Board also operates a vocational training, vocational rehabilitation and vocational guidance service, though no details are given.

Finally, the Labour Market Board has powers somewhat similar to those vested in the Board of Trade, enabling it to assist a locality or an industry by subsidy, by the

sponsoring of public works or by the placing of government orders. By these means some of the potential seasonal variation in employment have been ironed out. Whether the devices that have had substantial success in periods of general economic prosperity would be equally successful in the face of a serious general recession is uncertain. In such event it would seem probable that a more rigorous and drastic fiscal and monetary policy would have to be adopted, a point of view which is shared by all Swedish political parties.

In an attempt to evaluate the work of the Labour Market Board, it is conservatively estimated that the Board has made a very substantial contribution to Sweden's national output and standard of welfare.

H. G. MAULE

Basic Human Factors for Engineers. By PAUL A. VERDIER. London: Bailey Bros. & Swinfen, 1960. Pp. 103. Price 32s.

According to the author, 'the method presented in this manual is intended as the first systematic methodology for the new profession of Human Engineering'. In addition, it is claimed that this is a 'how to do it' book — how to conduct a human engineering analysis of a job and how to organise the function in a company. By implication, the author restricts himself to manual and control room work. He goes to great trouble in defining, in what he chooses to call 'engineering terms', four factors which affect performance. The assessments of these factors subjectively by the human engineer, and the use which is subsequently made of them, is apparently the core of 'the first systematic methodology'. The factors are: perception, judgment, internal stress, and motor ability.

The assessment and quantification of these factors on a three-point scale added to a job description or specification is the author's 'task analysis approach'. This approach is illustrated by the analysis of simple jobs such as the repair of pneumatic controls and micro-switches; then follows a description, one suspects for popular consumption, of its use in studying the human problems of space travel. The remainder of the book is concerned with the benefits of human engineering and how it can help personnel selection, training, the design department and the mental health of employees.

There would appear to be a number of complementary approaches in 'fitting the job to the worker'. Firstly, the work study officer can improve a workplace layout, especially if the job is a manual one, by reduction in the operator's physical effort. Secondly, published findings in the field of physiology and applied experimental psychology can be applied, to improve performance in work which is more mental in character — mental in the sense that man is a controller, who has to read dials and operate switches, in response to visual and auditory cues. Thirdly, the use of mock-ups and experiments: these are often used to verify points arising from previous work. Fourthly, and possibly the most rewarding in the long run, the use of some of the concepts of control engineering in the development and evaluation of complete man-machine systems. The author has ignored these more usual approaches to human engineering problems. He concentrates on the use of job descriptions and job specifications, and the evaluation of his four factors.

The 'task analysis approach' is claimed to be equally effective for both manual and control room work. For the analysis of short-cycle repetitive work, Crossman's sensori-motor process chart is much more detailed, as it combines the 'therblig' with the sensory analysis. For control room work, there appears to be no reason why the author's system should be any more successful than a detailed job description or specification of the operator's duties. To say that a man has to read a vernier is much more satisfactory than to say that he requires a high level of factor P(V). The 'task analysis approach' relies heavily on the subjective assessment of the sensory and psychological elements of a job by the human engineer. The danger is that design engineers and other lay users may be misled by the apparent precision of the task analysis results.

R. G. LACEY

First Aid in the Factory. By LORD TAYLOR. London: Longmans Green, 1960. Pp. x + 140. Price 9s. 6d.

Anyone who professes interest in the well-being and the effectiveness of the worker

must take seriously the facts which contributed to prompting Lord Taylor to write this little handbook. In 1957 less than 9 million working days were lost through industrial dispute. In the same year 275 million days were lost due to certifiable industrial incapacity; perhaps half of this total was due to minor accidents and illness which might have been successfully treated or prevented at work. There is only too clear evidence from recent studies that the first-aid services of industry have been neglected or ignored. Defective equipment administered by inadequately trained personnel for the use of ignorant and uninterested workers has contributed to the toll of lost time from minor causes. In searching through the existing literature it is difficult, perhaps impossible, to find a book that can easily be read and understood by the interested layman. This book does much to remedy the deficiency. Lord Taylor himself is admirably suited to the task he has set himself. His interests in mass communication led him to play a big part in the founding of the government social survey. As director of the Harlow Industrial Health Service he has had the opportunity of intimate knowledge of a cross-section of modern factories and of the medical and first aid facilities they provide. His impressive record of concern with the problems of modern society have taken him to the House of Lords as a life peer.

The handbook does justice to its author. At the outset Lord Taylor undertook a classical work study of what happened at the first aid station in the factory. On the basis of this, he has set out to tell first aiders and others about their problems.

It would be fruitless for this reviewer to enter into argument on what Lord Taylor teaches; as Dr Gagger says in the foreword, "there will always be some diversity of opinion as to details of treatment". What is clear is that he set out to teach simple general principles which will enable the first aider to give first aid, not to become a half-trained doctor; to know his limitations and not to be cluttered up with complicated possibilities which may never become realities.

Many books on first aid are confused by elaborate drawings or diagrams. The drawing in this handbook are a model in their exclusion of the unnecessary. It is not too much to say that everyone in industry who is in any way concerned with the prevention or treatment of injury can afford to have this book at his side; and few can afford not to.

H. G. MAULE

Psychiatric Services and Architecture. By A. BAKER, R. L. DAVIES and P. SIVADON. Geneva: World Health Organisation, 1959. Pp. 60. Price 2s. 6d.

This paper is divided into three sections, but the inter-relation between them is made abundantly clear. The first section is concerned with the planning of psychiatric services, whether in a modern highly advanced community or in a new and developing one. The next section deals with different types of psychiatric units — the outpatient and early treatment clinic, the day hospital, the psychiatric hospital, special units, after care homes and so on. The final section is most specifically concerned with the principles of architecture and design, including physical environment, and their relevance to the function of the psychiatric unit.

As early as 1819 Tuke called attention to the advantages of smaller units over larger ones and of small groups compared with big ones. Shrewd observer that he was, he noted that in those rooms in which the number of patients did not exceed 10 there existed 'a little family spirit' in which several patients were engaged in useful or amusing employment. In contrast, the large groups were characterised by solitude in the midst of society.

In conformity with the current thinking in this country, the pamphlet recognises three levels of treatment: where possible in the community, in the home supported by day hospital treatment, and in full hospital care. As soon as the reasons which give rise to these levels of treatment are accepted, it follows that the *hospital* should be planned on the basis of some initial privacy, individual living space and a person-to-person therapeutic relationship. The patient may later be able to integrate with small groups, and finally with larger ones. This enables social relationships to start at their most simple and become more complex as the patient progresses. The implication of this policy on design is at once apparent and quite contrary to the design and planning

of many of our mental hospitals that were built in the last century.

The 'chronic patient' hospital is condemned in the interests of both patients and staff. The problem of the patient who could be sent home but who has no home to return to should lead to the concept of the after care home, the sheltered workshop or working settlement, rather than the chronic hospital in which progress is likely to be obstructed. The very large mental hospitals to be found in Europe and North America are monuments to the lack of vision in the past. Despite the national prestige that derives from the huge institution, developing countries should avoid this pitfall and should aim at simple facilities which can develop by differentiation. Such a policy would facilitate a close liaison with the community. The various elements in the comprehensive scheme require organisational links to ensure the concept of continuous observation.

In considering the different psychiatric units that are required in a comprehensive mental health service, the current common sense of sociological theory is put forward. The discussions on the early treatment centre, a mother and baby unit, a medium-sized psychiatric hospital and a psychiatric ward are illustrated with architectural plans. The problems of alcoholics, drug addicts, mental defective and epileptic colonies are not discussed, as it is felt that more information about the first two and a clearer statement of policy and aims of the last two are necessary, before the architectural desiderata can be discussed.

A useful passage considers the steps that must be taken in converting the typical custodial barrack of the last century into an environment more in line with the therapeutic objectives of modern psychiatry. There can be little here that has not been realised and acted upon by our more progressive medical superintendents and management committees, but I suspect that there are still many mental hospitals in the United Kingdom where the wind of change has not yet blown and where the simple advice might well be followed.

It seems particularly appropriate that this W.H.O. paper should appear now. The Nuffield Provincial Hospitals Trust and others in this country are engaged in serious and dynamic thinking about hospital design. It is now being recognised that planning and design are vitally involved in the social and medical effectiveness of a hospital. It is right that readers inside and outside the United Kingdom should be exposed to the new climate of thought.

H. G. MAULE

A Survey of Social Conditions in England and Wales as Illustrated by Statistics.

By A. M. CARR-SAUNDERS, D. CARADOG JONES and C. A. MOSER. Oxford: at the Clarendon Press, 1958. Pp. xxi + 302. Price 25s.

Earlier editions of this book appeared in 1927 and in 1937, under the title *The Social Structure of England and Wales*. It has now been rewritten and enlarged to include social developments in the post-war period. The authors state in the introduction that 'The aim of the book is to present a coherent picture of some of the more important aspects of social life . . . so far as they can be illustrated by statistics'. The book is not intended to be a compendium of social data, nor a reference book; it is for all who want a readable and precise description of social conditions at the present time. It was published in August, 1958, and most of the data in the book were collected at least two years earlier. The most recent tables refer to the years 1955-6, while a number are based on the National Census of 1951. There are 19 chapters containing 143 tables of data taken from official and semi-official sources. The tables contain data expressed numerically or as percentages.

Almost every aspect of the social scene is touched upon. The chapters, which are in sequence, begin with a statistical breakdown of the general population by age, sex, marriage, and then deal with families, households and housing. There are further chapters on entry into employment, industrial distribution, occupations, industrial status and social class, protective associations, personal income, expenditure, social security, health, leisure, religion and crime. The authors have used a pleasing style of descriptive narrative, which gives coherence to the diverse topics which are dealt with. Little attempt is made to examine the implications of the data or to explain the pattern

of social change. This is left to the reader. They rightly point to basic weaknesses in the compilation and presentation of some official statistics, which suggests that in some instances those responsible for the original data were unfamiliar with basic statistical principles.

Some of the national statistics, interesting in themselves, do not stand up to very close examination. For instance, we learn that 'the National Food Survey for 1955 showed that the average rural household spent 24s. 2d. per head per week on food, receiving in addition 2s. 5d. worth of free food, while for the average urban household the figures were 25s. 7d. and 8d.' It is doubtful whether terms such as 'average rural' and 'average urban' household are meaningful any longer, when rural and urban communities may be separated only by a few fields and where even remote villages now have commuters who work in the nearest urban centres.

This is a readable book and clearly a great deal of care has gone into its preparation. It is all too evident that some of the data used in the book is far from satisfactory, but this is hardly the fault of its authors. It is to be hoped that the 1961 Census will be the precursor of improved national statistics.

ROY S. TAYLOR

Explorations in Management. By WILFRED BROWN. London: Heinemann, 1960. Pp. xxii + 326. Price 30s.

Glacier gets its bearings? Reading this book is rather like progressing through a Hegelian dialectic. Thesis: here, at last, is *the* book on management, enunciating concepts of a high enough level of abstraction to have a wide validity, while still being based on the messy reality of confused incident. Antithesis: this is no more than a brief to his staff by a Managing Director (which it is) telling us when to speak in public, how to hold an appeal, how to treat the personal idiosyncrasies of one's subordinates—all good commonsense, but not much more than a series of tips to an aspiring manager. Synthesis: this is both a theoretical *and* a practical book, the incidents described are as far as possible put in a theoretical context, the theory based on fact; it has much to teach and perhaps more to stimulate and tells us at once more and less than it thinks it does.

The book opens with a chapter on the analysis of organisation. This very largely deals with the shortcomings of current management thinking, particularly the prevalent confusion about the use of words—a confusion which, we are told, leaves our minds fogged with unreal ideas, that makes systematic training virtually impossible and retards the growth of management courses at university level. What is needed in this field is a clear description of what is happening, hence (at Glacier) "I have . . . supported a policy of studying how we do our jobs as managers, analysing the processes we use and endeavouring to extract from a mass of experience any principles or concepts which appear to have a general validity in our circumstances. The purpose of this book is to record the current state of the Company's knowledge in this field." (p. 3) Moreover, the work carried out "in our Company for the last ten years . . . by independent observers who had no preconceived notions" gives "strong grounds for the belief that this description of organization is valid for industry in general." This, because the Company is subject to "all the normal cultural pressures of British Society and British Industry" and because "we employ 3,600 people. With a sample of this size it would be unrealistic to maintain that we are not an average cross-section of the British Population." (p. 11)

So far our thesis. Our hopes are mightily raised; but so too, it must be confessed, are our doubts. There follows a fairly long section on structure which will be described in some detail to give an idea of the scope of the work. This begins, very sensibly (and originally), by pointing out that the work to be done determines the organization required and that what might be a suitable structure for one situation might not apply to another. But, whatever the structure, there is only one way to define it—as a set of interrelated roles (a role being "a position into which decision making work is allocated"), the planning of organization being deciding which roles should take which decisions. (It will be noted, as one would expect from Dr Jaques' book, that

the prescribed content of a role is not, for purposes of analysis, part of the role.) There follows, for guidance, four possible analyses of an organization, the 'manifest' organization—what is supposed to be; the 'assumed' organization as it appears to an individual (this could vary from one person to another); the 'extant' organization—what it really is; and the 'requisite' organization—what it should be. At all costs we must find out the extant and requisite organizations and move from one to the other. If there is inefficiency anywhere we must "look for trouble inherent in the design". Once we have done this, and made it clear to all, human relations problems will appear as organizational problems, there will be consistency of action through shared knowledge and changes will be seen as obvious and necessary and therefore not resented. As Brown says, "The chapters that follow are in themselves examples of how the ideas which have been discussed so far can be used." (p. 44)

What does follow? In a way this is the watershed and the antithesis sets in. We get some very interesting comments on the giving of advice to subordinates (one cannot give advice, it must be seen as an instruction. If the subordinate does not take the advice and succeeds he makes one look silly, if he does not take the advice and fails, he makes himself look silly), on the appointment of subordinates (internal advertising, the need for a long-term view, a *pro forma* job specification), and on how to deal with disagreements in executive matters. On this latter point, Brown particularly deals with disagreements amongst 'collateral relationships'—relationships between two subordinates who have the same boss but who have to interact in discharging their functions.

All this is most interesting and stimulating, but it is really more a series of shrewd observations than it is a theoretically adequate account of what goes on in certain situations. There is one panacea—the one to be expected from Tavistock influence—make clear what is really happening, reveal to your staff the real forces at work of which they may not be aware, and make the situation explicit so that the 'sociological' as opposed to the 'psychological' situation is remedied. Having done this, you must point out to each subordinate what exactly his responsibilities are, and liberate them from the acrimony and diffidence associated with unclear terms of reference.

This is pure gold: anything that leads managers to be more charitable and less anthropomorphic and makes them ask themselves just what they expect their subordinates to do, is that. And yet the dawning suspicion that this is really an extended minute circulated by the Managing Director (as he then was) to his staff gains force (an M.D., by the way, who practises what he preaches in writing the book).

At this point two things can be said. In the first place, it is difficult to summarise the remainder of the book, since, despite the high regard the author has for organizational theory, there is really no single motif or set of motifs which lend themselves to critical appraisal. As the author himself says at one point, "I am making observations, not presenting theories." (p. 226) And whilst the observations are of great interest they are as varied as life, and just about as manageable.

The overriding contention is, in fact, the one already mentioned—the need to understand clearly what happens. This is followed up in interesting and unexpected ways: the power of the worker should be recognised and it is only common sense to canalise it by the use of some sort of consultative system; the real role of the specialist should be acknowledged by his being given explicit line authority under certain circumstances; and, coming down to individual cases, we must always remember that an individual who knows what he is not allowed to do will show more initiative than one who is speciously encouraged to stand on his own feet. But this is about all.

Secondly, being very purist, it could be said that the weakness of this very pragmatic approach emerges most clearly when Brown is dealing with everyday snags and troublesome details. These are not looked upon as problems in their own right, but as something that 'should cease'. Thus at one point he complains that there is a tendency to regard the status of a job as depending on the number of links between it and the top. (It should depend on the time span of the job.) The consideration that a communication channel is used to the extent 'it works' (as Homans points out) and that

position in the network can *itself* determine influence (as Leavitt pointed out) is not treated as being of intrinsic interest. Similarly, the problems of the collateral relationship (where two subordinates have to interact) is not seen as being different in kind from a situation in which there are no horizontal links between peers. This is more than just a snag. It raises the whole problem of how a boss can supervise the work of his subordinates where, more than elsewhere, the subordinate creates the situation in which he works (by his relationship to his colleague), and where very probably the subordinates (since they are intercommunicating) know more about what is going on than the boss—a situation, as Burns has pointed out, which is liable to become more acute when innovations are introduced. (This might be as good a place as anywhere to say that, apart from reference to Dr Jaques' work, there is practically no mention throughout the book to any other work in this field.)

Perhaps enough has been written to give the flavour of the original. There are many excellent things in later chapters which cannot be adequately condensed in a review. Some of the highlights are sections on the nature of policy and its delegation. (I feel there is a need for a sharper differentiation here between prescribed ends and prescribed means.) Brown also deals with the differences between managerial as opposed to conventional committee meetings (this section badly needs reading in some firms). There is a most interesting analysis, highly original, of specialist work; a brilliant chapter on the supervisor (he performs the work which the operator, because he is tied to his machine, cannot do) and also quite the most persuasive account of the Glacier representative and legislative systems I have read. Throughout the author is sternly pointing out to doubting Thomases that he is merely describing what actually happens, and that the facts of industrial life must be faced. This applies, as has already been hinted, in unexpected ways. Workers always will have power and there is no point in not admitting it. It would even be a good thing if they recognised it themselves. "People with power, who remain unaware of the fact, can unwittingly use their power irresponsibly." (p. 243) Even his startlingly original treatment of the specialist problem — a specialist is given power to enforce policies agreed by his (line) boss on his (line) colleague — is stated as nothing new. Very probably it isn't. Finally, and this comes well from a boss, there is the recurring theme of the inescapable influence of the superior on the subordinate. Rarely has the responsibility of the leader, in all phases of the company's activity, been more squarely faced.

It is after reading the book that we reach the third stage, the synthesis. Here we have a text by one who has been a practising Managing Director for many years, who has thought hard about management problems and has tried with some success to bring order into the multifarious circumstance of industrial life. In a way he claims too much, and so, to some extent, he disappoints. We feel, for instance, that Brown would like to say that a Glacier system of joint consultation is objectively necessary everywhere, and yet some firms, which by any reckoning survive and prosper, do without it. Perhaps the author is more ethically oriented than he would like to appear to be. Be this as it may, his stress on sociological as opposed to psychological factors, his concern with making the implicit explicit and recording it (there is an appendix giving the Company Policy Document, and a comprehensive document it is), and even his small scale practical examples — all these show us that we are throughout the book reading the conclusions of an experienced and inquiring administrator. The result is a book that is of interest both to the theorist (but he must not expect too much) and the practical student (but he must not expect too little). Above all, and this is saying something in this field, it is immensely readable with a complete absence of padding. It draws fairly heavily on Dr Jaques' previous work but it stands on its own feet as complete in itself. Texts of this nature are often highly theoretical and unreadable or highly readable and of very doubtful value. This is neither. As a discussion text for the Management Practice and Management Principles papers in the British Institute of Management examinations it could hardly be bettered, as a practical man's thoughts on the subject, working at the weekends and when he found time, it very probably never will be bettered.

ROGER HOLMES

Research Techniques in Human Engineering. By ALPHONSE CHAPANIS. Baltimore: The Johns Hopkins Press (London: Oxford University Press), 1959. Pp. xii + 316. Price 48s.

This book by a highly respected pioneer and acknowledged master is an important and bold attempt to lay down sound methods for the field of study which is known variously as 'human engineering', 'engineering psychology', or 'psychological ergonomics'. It is based on a monograph published in 1956 under the title *The Design and Conduct of Human Engineering Studies* which was prepared at the request of a committee representative of the three (United States) armed services as a survey of research methods available in this area.

The book begins with a stimulating introduction outlining briefly the history and present scope of this kind of study and then proceeds to discuss three main types of methods, each illustrated with examples drawn from past research. The first type of method—that of 'direct observations'—includes some salutary warnings about pitfalls in the study of opinions by direct questioning, and describes several techniques which, although mainly belonging to work-study, have applications in other studies of human performance and behaviour. The second method—the study of accidents and near accidents—is well summarised and should perhaps be taken as an example representing the much wider range of enquiries that the human engineer can usefully make by examining industrial and operational statistics. A fuller treatment of this kind of work would have been desirable and its absence is, probably, the book's one serious omission.

The two chapters on experimental methods are, even for an experienced experimenter, a useful reminder of the points he must consider. They are preceded by a chapter on statistics which, somewhat surprisingly, covers only normal statistical methods. This is perhaps understandable since the treatment of experimental methods is closely tied to analysis of variance, but it is surely fair to urge that non-parametric methods and the binomial approach to statistics are important research tools in this field.

The book ends with two chapters whose usefulness, although not interest, is more restricted: the first on the psychophysical methods and the second on the design of speech-communication systems.

The treatment is too specialised for the general reader, but the book seems well suited as a seminar text for post-graduate courses in human engineering whose members come partly from experimental psychology and partly from other disciplines. As such it must be hailed as valuable and timely. Its one feature which is not quite satisfactory for this purpose is the chatty style which gives it a 'told to the children' atmosphere, lengthens the text and accords ill with the breadth and elegance of vocabulary used. This style seems to be increasing in American textbooks for students: a British student prefers to gain information at the same rate from simpler sentences with fewer words read more slowly.

A. T. WELFORD

Principles of Comparative Psychology. Edited by ROLLAND H. WATERS, D. A. RETHLING-SHAFFER and WILLARD E. CALDWELL. New York: McGraw Hill, 1960. Pp. viii + 453. Price 62s.

This is a collection of articles by 17 American authors dealing with work on animal behaviour. Readers of *Occupational Psychology* who are interested in keeping up-to-date with general psychology will find it useful, since animal studies now form such a large part of general psychology. It may also be useful to those who are looking for new techniques in human psychology; techniques evolved for animal work can sometimes be adapted for this purpose, and the book sets out to describe a great many, though not often in detail. On the other hand, readers who are interested in animals for their own sakes might find it more entertaining to turn elsewhere (for instance to *Animal Behaviour* by J. P. Scott, a contributor to the book under review).

One of the first faults an English reviewer is likely to look for in an American book is ignorance of European work, and it is not necessary in this case to go beyond the first chapter before finding it. This chapter, contributed by one of the three editors, is in the nature of an apology. In it he gives two examples of ethologists working in England or Scotland: Russell (presumably the late E. S. Russell) and Darling, whose

However, many of the remaining chapters are first class. Two of them (on sensory processes and learning) are highly sophisticated regarding interspecies differences, and it is splendid to find two good chapters on genetics and classification (including behavioural taxonomy). The preface promises a section on 'the effects of early experience on sensory and perceptual abilities', but in fact one of the most disappointing omissions from the book is an extended section on early learning, critical periods, etc. There are a few slight references in several chapters, but, as is true for several topics, the references are not related to each other. The impression is that the authors did not see each others' contributions.

B. M. FOSS

1958. Pp. 177. Price 5 N.F.

DENIS MCMAHON

Pp. xvi + 476. Price DM. 38.

1960. Pp. 286. Price NF. 10.

1960. Pp. 286. Price NF. 10.

The book by Meili is the fourth edition of the volume which has always been an excellent introduction to the field of diagnostic testing. The new edition, brought up to date and more inclusive than the last, makes this without doubt the best book of its kind in the German language, and indeed it would not be at all easy to find a better one in English. Measures of intelligence are included as well as measures of personality; questionnaires and objective tests as well projective ones; technical points of test construction and validation are discussed, as well as the statistical treatment of data (including factor analysis). The tone is sober and critical throughout, and the coverage wider than in most English or American books of this kind, where Continental contributions tend to be neglected altogether. The German and French literature is represented much more thoroughly than is usual, and consequently even the expert may discover new and interesting material in these pages. Unfortunately the coverage of the English and American literature is rather less satisfactory. Whether this is due to the difficulties

experienced in getting hold of the Journals, of which Meili complains, or whether it represents his considered judgement of the relative importance of these contributions, it is impossible to say; nevertheless, in the reviewer's opinion, the book would have been even better if greater attention had been paid to these publications.

In comparison with Meili's book, that of Anzieu is slight and uncritical. He deals in a superficial manner with Rorschach and one or two other tests, but clearly lacks both statistical knowledge and research experience. Although the whole book is devoted to projective methods, yet the number of studies cited is very small and does not include the large series of devastatingly negative empirical validation studies published in the last 15 years. Readers will be surprised to find that there is no index and no bibliography at the end of the book. Internal evidence suggests that this is due, not to the failure of the author to provide these, but rather to a decision of the publishers. Having once suffered in a similar manner when the same publishers, without warning, failed to print the bibliography of one of my own books, I feel strongly on this point. It seems monstrous that a publisher should suppress for reasons of economy an absolutely vital part of a book, and the strongest protests would seem to be due from all who buy such a book and suffer from this high-handed action.

H. J. EYSENCK

Pioneers in Criminology. Edited and introduced by HERBERT MANNHEIM. London: Stevens, 1960. Pp. 402. Price 45s.

Presented as the first in a forthcoming library of criminology, this book consists of critical articles on the work and ideas of seventeen men. Although they came from a diversity of professional disciplines, each happened in his day to be interested in the problems of crime and of criminals. Social studies in those fields received such impetus from their thought and achievements that we claim them now as 'pioneers' in the developing science of criminology. Each pioneer is here reviewed by a different author and the list of the latter includes names eminent in modern criminology. Several of the articles, e.g., Peter Scott on Henry Maudsley, Marvin E. Wolfgang on Lombroso, Thorsten Sellin on Enrico Ferri, are models of concise informative writing.

In a concluding essay, Professor Clarence Ray Jeffery outlines the historical development of criminological studies. The initial 'classical' studies of crime by lawyers were supplanted by 'positivist' ones by sociologists and psychiatrists, with their demand that the explanation of criminal behaviour and the treatment of individual criminals must be accomplished by scientific means. In his introduction, Dr Herbert Mannheim considers the role of each of these pioneers in this developing historical process. He also provides a critical commentary to Professor Jeffery's essay by discussing the meaning of positivism in the history of social science and the place of the positive school in international criminology.

As an outline to the history of one of the younger social sciences and of the sociological and penological problems with which it has been concerned, this book would appear to offer an authoritative introduction to its subject. There are references and selective bibliographies to encourage an approach to the source material.

J. H. FITCH

Mental Health Problems of Aging and the Aged. Sixth Report of the Expert Committee on Mental Health. Geneva: World Health Organization, 1959. Pp. 52. Price 3s. 6d.

This report is naturally concerned mainly with the medical and social aspects of the topic, but it contains an important and lucidly-expressed section on preparation and education for old age which should be of interest to occupational psychologists, and to personnel and education officers. It will perhaps provide some of them with a little ammunition when battling against the attitude that retirement is no problem for the company so long as there's a pension scheme.

ALASTAIR HERON

Industry's Interest in the Older Worker and the Retired Employee. Proceedings of a Conference, edited by M. T. WERMEL and G. M. BEIDEMAN. California: Institute of Technology, 1960. Pp. vii + 35. Price \$1.00.

This contains some of the papers prepared for a conference of business executives,

educators and community leaders on problems of retirement. Apart from a valuable survey of current practice on retirement preparation schemes among large American firms (by Dr Wermel) there is an interesting account of the way the Tennessee Valley Authority (TVA) has been tackling the problem, and a paper on the official approach of the U.S. Department of Labor to the middle-aged and older worker question (by James O'Connell, the Under-Secretary). It is warmly recommended. ALASTAIR HERON

The Trade Unions, the Employers and the State. By HARRY WELTON. London: Pall Mall Press, 1960. Pp. 178. Price 17s. 6d.

This book is for the general reader and will serve as an introduction to Industrial Relations. Such readers may well enjoy the trip laid on by Mr Welton around the British Trade Union movement, during which he comments on some of its main institutions, the T.U.C., A.E.U., T. & G.W.U., etc., etc., and chats on a number of current issues from strikes to the closed shop. The main value of the work will be the insight he gives into the traditional and even tribal characteristics of a movement which in general is seen to be practical and governed by men of integrity and commonsense. In the widening discussion of industrial relations, and with the growing importance of this range of industrial problems, it is important not to expect now from the Trade Union movement or from employers action which they are quite incapable of producing except in the longer period. That way leads to frustration and contributes to bad relationships. The limitations as well as the power of industrial organisation needs to be understood. Though Mr Welton hardly mentions it, organisation on the employers' side is as bad as or worse than on the Trade Union side. To keep in balance, he should have analysed the implications of the B.E.C. — F.B.I. conventional distinction between 'industrial relations' and 'production problems', and of the fact that *vis à vis* the one T.U.C. there are five national employers' organisations, if nationalised industry is included. Trades Unions do not operate in a vacuum. They mesh like gear wheels with the employers. But neither of them is polished or has seen the inside of a machine shop; both are more historical accidents than products of our scientific age. This of course is the same with much in our society, and as usual one can say 'it works'. But it is no wonder that this industrial relations gear box generates heat periodically and has hot spots which require first aid and liberal lubrication. In the absence of objective standards it is a little difficult to be precise as to *how well* 'it works'; and the question remains as to how much improvement—in the form of a more dynamic and progressive economy and not just one in which fewer days are lost in disputes—will come from mere lubrication and how much is dependent on some improvement in design. TED FLETCHER

Food Preferences of Men in the U.S. Armed Forces. By DAVID R. PERYAM, BERNICE W. POLEMIS, JOSEPH M. KAMEN, JAN EINDHOVEN and FRANCIS J. PILGRIM. U.S.A.: Department of the Army, 1960. Pp. xii + 160.

This report effectively summarizes eight separate surveys of the attitudes of U.S. Servicemen to a variety of foods. These investigations, each of which involved a minimum sample size of 2,000, were carried out between 1950 and 1954. A 9-point 'hedonic scale' was used to express the respondents' views as to the extent to which the various items (identified by name) were liked or disliked. Information about age, length of service, education and region of origin, etc., was also included. The immediate aim was to provide data for large-scale menu-planning. However, sections of the report include the critical discussion of many underlying problems and the use of the rating scale data to predict certain measured acceptance criteria is examined. The report includes many tables and graphs. One table gives detailed information about some 438 food items, including 'percentile ranks' derived from average ratings. The response distributions for typical items are also examined and reveal interesting features reminiscent of attitude data in other contexts. For example, even the least favoured items are likely to appeal strongly to about 5 per cent of the respondents. Many other features of interest could be noted. The report admirably illustrates what can be accomplished with very simple tools, provided sample sizes are adequate. All who are directly concerned with

the study of attitudes will find much useful information here and the report should be prescribed reading for those dealing with problems of food acceptance.

R. HARPER

Behavior of Industrial Work Groups. By LEONARD R. SAYLES. New York: Wiley, 1958. Pp. viii + 182. Price 38s.

In one way at least, this is a remarkable book: it reports an enquiry based on a comparative study of 300 work groups in 30 plants, without any attempt at quantification. Presumably Dr Sayles, who is an associate professor in the Graduate School of Business at Columbia, adopted his procedure deliberately. It is difficult to see what he hoped to gain by it. He has probably, in fact, lost a good deal; for many of his observations and conclusions are stimulating, and may be based on solid foundations, but they are not likely to cut much ice with readers who like to have a look at their author's evidence and do some counting.

His theme is this: "Although at any one time particular work groups may tend to be more (or less) management or union orientated, such attitudes are less important in explaining the industrial relations life of the plant, than the dynamic relationships among concerted interested aggregations. At a particular period some of these groups may be in relative equilibrium, but many are motivated to gain new benefits or defend old ones. Their efforts in such endeavours will be instrumental in shaping the effectiveness of management and union policies." The groups studied (all blue-collared) differed in a number of ways, particularly in their approach to their problems: these were labelled the Apathetic, the Erratic, the Strategic and the Conservative. The job was done by Dr Sayles himself, mainly through interviews and the study of work records.

ALEC RODGER

Annual Review of Psychology, Volume 12, 1961. Edited by P. R. FARNSWORTH. Palo Alto, California: Annual Reviews, Inc., 1961. Pp. ix + 533. Price \$7.50.

The reform of the *Annual Review* goes on steadily, for better and worse. In this issue there are good chapters by Torgerson (on scaling and test theory), Messick (on personality structure) and Ward Edwards (on behavioural decision theory); and what looks like a very good one — the only British contribution — by Thorpe, whose review of comparative psychology is much more than the all-too-common string of summaries of recent work.

The chapter on personnel selection by Taylor and Nevis, both of the Personnel Research and Development Corporation, of Cleveland, Ohio, is disappointing from start to finish. It opens with a remark, 'Like job analysis and attitude surveys, personnel selection is one of the traditional areas of industrial psychology', reminiscent of the category-mixing that used to go on in the early days, when industrial psychology was said to be concerned with 'tests, accidents, labour turnover, interviews and sometimes statistics'. It concludes with a gloomy comment on the limited amount and restricted nature of current research in the personnel selection field. The bibliography suggests that neither of the authors looks at anything but American literature.

There is a chapter on industrial social psychology by Vroom and Maier. Some may think that rather too much of it is taken up with references to Maier, and some be faintly surprised that the bibliography lists three of his yet unpublished papers; but the material here is far better than the stuff in the chapter on personnel selection.

Once again it has to be reported that mentions of work done by non-Americans are few and far between. Of the little United Kingdom band, Eysenck does remarkably well with five. A new 'high' is hit by two Americans, E. A. Bilodeau and I. McD. Bilodeau, who have a couple of dozen between them; but it is only fair to add that these are found exclusively in a chapter on motor-skills learning contributed by Bilodeau and Bilodeau.

ALEC RODGER

Status and Pay of Women Supervisory Staff (on the Factory Floor). Information Summary No. 17. London: Institute of Personnel Management, 1961. Price 10s.

Replies to a questionnaire on the duties, responsibilities, remuneration, privileges and prospects for promotion of various grades of women supervisory staff were received

from eighteen factories. The factories varied greatly in size (from about 200 to about 11,000 employees) but varied less in industry as eleven of them were manufacturing foodstuffs or sweets.

The answers received are set out in tabular form for each factory and contain much useful information. A one-page summary is given at the beginning of the pamphlet. It is a pity that this has not been extended, for the person seeking knowledge has to do a lot of work to compare the conditions at different factories.

So little has been published that is authoritative on the conditions for women supervisors that the hard labour will be well worth while. Perhaps in a later edition the editor will extend the publication to give summaries by topic as well as by factory.

WINIFRED RAPHAEL

Community Mental Health Services. Planning, 26, No. 447. London: Political and Economic Planning, 1960. Pp. 16. Price 2s. 6d.

P.E.P., generously aided by the Nuffield Provincial Hospitals Trust, has recently begun a three-year study of the Mental Health Services, paying particular attention to the aspect of community care. This excellent half-crown's worth lays out the background and makes suggestions for areas of research in this field.

Recent history, in the form of the Mental Health Act, 1959, and modern treatment methods are touched on by way of introduction to the notion of community care and we are reminded (for example, by Russell Barton) of the dangers of institutionalisation awaiting the patient whose treatment is not linked to a clearly defined progress into the productive and domestic community. We are reminded that only "in a few areas policies aiming at a deliberate integration of hospital and community services have been put into effect" (p.342), but it is slightly annoying to be then told that two such experiments have been tried, but to be given only the scantiest detail and no references. Although this broadsheet is patently discursive rather than a detailed review this reticence about sources of information (which seems most pertinent and useful) is disappointing and recurrent. Certainly more detail is given about a Scottish study of 500 discharged patients of a group of mental hospitals, but even here one feels that the original write-up would be worth looking at; and, if there is no such thing, then more detail, about the employment available, or factors precipitating re-admission, for example, should have been included. The implied problems, however, are clearly seen and on p.346 we read: "This substantial evidence of poor work adjustment indicates a major need for (vocational) guidance." Less than one in six of the 500 patients had the benefits of an I.R.U. or similar agencies, but to those psychologists among us who work in hospitals a timely reminder to pay heed to our occupational psychology is administered, together with an echo of the Piercy Committee's recommendations in this passage (p.347): "for it is increasingly becoming recognised that occupational rehabilitation is not something to be added at the end of a more or less successful course of treatment but may often be an intrinsic part of the therapeutic process."

When the pamphlet comes to review Local Authority provisions and proposals for community mental health services we find odd variations in expenditure from 2d. per head in two Welsh counties to 4s.4d. in a medium sized county borough in Lancashire. There are also the sketchiest of notions about how such services should be staffed. Hostels and training centres seem to be thought of as appropriate to the mentally sub-normal, but less so to the mentally disordered. Vocational guidance and work motivation is paid not even lip service, and the word "psychologist", for better or worse, is not even mentioned. It is commented that doubts about adequate financial support may be worrying the 120 local authorities from whom information was gathered, but "apart from this, it seems probable that many public health departments recognise that some of their new obligations have an unfamiliar character and are uncertain how they can best be discharged" (p.352).

Finally, and succinctly, some problems for research are indicated, problems demanding both an extensive and intensive approach. These include "some estimate of the social and personal consequences for patients and their families of different patterns of care", "systematic analysis of the work actually performed by health visitors,

Psychiatric Social Workers, etc.", "the part played by voluntary organisations and the work of the family doctor" and, less concretely, "certain limited studies of attitudes and beliefs" to and about mental illness.

The overview and perspective is good. The writing is even in quality, free of mannerisms and concise. The problems under consideration are sure to grow in the next few years, and as this broadsheet shows will embrace many disciplines even within psychology. We look forward to the results of the study this broadsheet adumbrates.

D. F. CLARK

Other Books Received

The following books have been received. Their inclusion in this list does not preclude their review later.

- Les Methodes Projectives.* By DIDIER ANZIEU. Paris: Presses Universitaires de France, 1960. Pp. 286. Price N.F.10.
- Group Dynamics.* By DORWIN CARTWRIGHT and ALVIN ZANDER. Editors. London: Tavistock Publications, 1961. 2nd edition. Pp. xii + 826. Price 42s.
- L'Automation: Aspects Psychologiques et Sociaux.* By A. CHAPANIS and others. Louvain: Publications Universitaires, 1960. Pp. 119. Price 110F.
- Growing old in a Mechanised World: the Human Problem of a Technical Revolution.* By F. LE GROW CLARK. London: the Nuffield Foundation, 1960. Pp. 145. Price 7s. 6d.
- A Guide to Use in Clinical Practice and Research.* An M.M.P.I. Handbook. By W. GRANT DAHLSTROM and GEORGE E. SCHLAGER WELSH. Minneapolis: University of Minnesota Press (London: Oxford University Press), 1961. Pp. xviii + 559. Price 70s.
- Reluctant Rebels. Re-education and Group Process in a Residential Community.* By HOWARD JONES. London: Tavistock Publications, 1961. Pp. vi + 234. Price 30s.
- Hysteria Reflex and Instinct.* By ERNST KRETSCHMER. London: Peter Owen, 1961. Pp. 162. Price 30s.
- Man and his Machines. Automation and Computation — their Origins and Effects.* By SIR BEN LOCKSFEISER. London: Institute of Personnel Management, 1960. Pp. 12. Price 2s. 6d.
- Directory of Employers' Associations, Trade Unions, Joint Organisations etc., 1960.* By MINISTRY OF LABOUR. London: H.M.S.O., 1960. Pp. xii + 177. Price 21s.
- Labor-Commitment and Social Change in Developing Areas.* By WILBERT E. MOORE and ARNOLD S. FELDMAN. New York: Social Science Research Council, 1960. Pp. xv + 378. Price \$3.75.
- Food Preferences of Men in the U.S. Armed Forces.* By DAVID R. PERYAM and others. U.S.A.: Department of the Army, 1960. Pp. xii + 160. Price not stated.
- Community Mental Health Services. Planning, 1960, XXVI, No. 447, 339-354.* Price 2s. 6d.
- L'Adolescent en Apprentissage.* By JEAN ROUSSELET. Paris: Presses Universitaires de France, 1961. Pp. 145. Price not stated.
- Jordi.* By THEODORE ISAAC RUBIN. New York: Macmillan, 1960. Pp. 73. Price 10s.
- I am a Bank Clerk.* By PHILIP N. RUSSELL. London: Macmillan, 1960. Pp. 127. Price 4s.
- First Aid in the Factory and on the Building Site and Farm, in the Shop, Office and Warehouse.* By LORD TAYLOR. London: Longmans, Green, 1960. Pp. x + 140. Price 9s. 6d.
- The Life and Work of Elton Mayo.* By F. LYNDALE URWICK. London. Urwick Orr, 1960. Pp. 34. Price 4s.
- Basic Human Factors for Engineers.* By PAUL A. VERDIER. London: Bailey Bros. & Swinfen, 1960. Pp. 103 + tables. Price 32s.

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Rédaction et Administration: Square Jouvenet, PARIS 16°

Abonnements (un an) France: 15 NF; Etranger: 18 NF

Le numéro: France 4 NF; Etranger 5 NF

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OCCUPATIONAL PSYCHOLOGY

JULY 1961

VOLUME 35 NUMBER 3

Psychopathology and Occupation Part 2, Work and Competition*

By LAWRENCE ZELIC FREEDMAN
and STANLEY A. LEAVY

(Center for Advanced Study in the Behavioral Sciences, Stanford, California, and
Department of Psychiatry, Yale Medical School, New Haven, Connecticut)

I: WORK

WE wanted to learn how the work in which our patients were engaged was related to the neuroses which they suffered. The questions we asked ourselves were: "Did their work contribute to their neuroses? Did their neuroses affect their work?"

(a) *The Obligation to Work*

We must start with the observation that in our society a person must work. By this is meant something in addition to the realistic obligation to earn a living, important as that is. The need to support one's self and one's dependents, and the urge to provide for the satisfaction of needs and taste beyond the level of subsistence, are not the only powerful pressures that move men to work. A person who does not work is considered to be either sick or bad. This is a socially developed criterion, a derivative of a philosophy of life which has long characterized America. Kingsley Davis (20) has shown how this criterion, along with certain other social values, is part of the unspoken standard of health toward which efforts at mental hygiene are directed. Like all such norms, it is usually accepted as self-evident. However it is not difficult to obtain information about other cultures in which this norm has not been accepted as self-evident.

Ralph Pieris (21) writes of the difficult transformation of Ceylonese society during the nineteenth century, from one in which work beyond the needs of subsistence was not a highly valued form of activity, to the urban conditions, under strong Western influence, in which work has very high value. A major contribution of the anthropologists is the concept which holds that such institutions as work, like religion and medicine,

*Part 1 of this paper was published in the Jan.-April, 1961, issue of *Occupational Psychology*.

are not always so sharply differentiated from other life activities as they are in the Western world. This segmentation of society, to use Curle's (22) term, itself establishes a differentiation between economic activity and all the other forms of behavior. Before society is so divided, economic and other pursuits form a continuum and such problems as those we are investigating could not arise.

The psychiatrist, in accord with the conventions of his culture, which sanction work and condemn idleness, assumes as a rule that the person who does not work is ill, and that the ability to work once more is an evidence of the recovery of mental health. Patients themselves usually recognize this fact and stress as complaints, in many cases, their inability to carry on their work. (Schilder (23) described this as a characteristic complaint of virtually all patients—an excessive generalization, by our experience.) The contrary situation exists in which symptomatic behavior is seen rather in the patients' excessive preoccupation with work in which their involvement is compulsive. The psychiatric understanding of work as an indication of health is simply that failure to conform in this respect with the social convention is the product of emotional disturbance, or the outgrowth of character disorder. This is a fundamental and universal convention—at least within the limited society which we are discussing.

As we have assumed, the concern of the healthy person to work is due in part to his realistic appraisal of his situation—that his living conditions ultimately depend upon work, within the expectations of this society—but it is due also to the social disapproval of inactivity and to the less tangible need for work as itself a satisfaction of emotional needs. It would not be out of place here to look farther into the second of these considerations; for how is it that this social disapproval would play such a significant part in the lives of individuals? We have discussed the ways whereby socioeconomic norms become part of the 'understood' values of persons and hence help to determine the kinds of economic situation which they enter.

Through these processes work achieves the status of one of the primary values, at least within the context of contemporary American life. The educated 'gentleman' of, for example, Jane Austen's novels might be engaged in any of a number of activities which produced no other noticeable result than entertainment and the exploitation of a largely hereditary social status. In America men do not carry on their lives in this fashion without incurring social disapproval. Even the artist who is producing concrete objects by his efforts must as a rule justify his existence by engaging in work the product of which can be more readily sold. Women are still to a great extent permitted to spend their time in activity whereby no money is earned, even those who personally need not care for their homes and children; but frequently they must account for themselves by engaging in the pursuit of useful concerns, unless they are willing to accept a sort of social isolation (itself considered a mark of illness in our culture). Of course there are other special problems of women inherent in this necessity for undertaking work that hitherto had been restricted to men; but the point

of importance to us is the fact that with women, too, useful work involves status, if not moral obligation.

Where the feeling of obligation to work is not present, we expect to find also other evidences of illness or character defect. In our cases such a failure to conform was found only in persons who showed severe defects in the whole sphere of responsibility. A young man, who expressed almost all values in terms of money, did not accept the obligation to undertake any form of employment; insofar as he did look for work, it was under external compulsion. His various attempts at schooling were defeated, despite his adequate intelligence, by his inability to take seriously any of the scholastic requirements. Persons of this type of character come into constant conflict with their environment because the obligations of the society have never become fully internalized.

Far more frequent is the complaint among our patients that their self-respect is impaired when their symptoms prevent them from working. Not working in a community where nearly everyone works is itself sufficient to arouse feelings of guilt and depression. It stirs up old anxieties that may have been long latent concerning one's ability to achieve and maintain independence. The patient who is not working is confronted by threat of protests from the relatives who are contributing to his support, whether or not these protests are ever actually manifested. He adds to his existing feelings of inadequacy the picture of himself drawn from reality as one unable to meet a fundamental demand of the society. To be sure this complaint, while real enough, is balanced by an unconscious gain, in the form of pleasures realized by being allowed to maintain a dependent existence. In such instances, however, the obligation to work is not denied; it is the urgency of the symptoms that prevent participation in the work which is emphasized.

(b) The Type of Work

There is a further consideration on this question of work, which concerns the type of work in which men feel they must engage. We saw only a few patients who either had, or expressed ambitions for, work which in the opinion of the psychiatrists—i.e., in accordance with the psychiatrists' own values—were classed as socially undesirable. An instance associated with our cases is pertinent. The husband of a hysterical young woman patient, V., was a 'bookie', earning by his gambling enterprises a very substantial income. Both husband and wife acknowledged his business openly. He said that he felt sorry for persons who had to work more than four or five hours a day to earn their living. It was difficult to establish from the record to what an extent the patient needed to defend her husband's profession, since she stoutly denied concern about the illegality of it, and extolled the virtues of gamblers. Nevertheless she also hoped that her children would not engage in this kind of work. Naturally this type of problem becomes of special interest to psychiatrists who assume that the patient cannot integrate into her personality without tension the acceptance of an occupation which

significantly deviates from the standards of her community. (It should be added that this man particularly held in disesteem the profession of psychiatry, which he called 'a racket'.) His wife, V., was the daughter of a poor immigrant laborer, and had suffered poverty in her youth; her marriage relieved her from the necessity of worrying about money, and this seems to have at least partly resolved the ambiguity of her attitudes.

Another patient, a young man of dull intelligence, suffered intense anxiety in routine work. Yet his self-esteem required of him that he be economically independent, and the 'big bookies' who flashed by in expensive clothing and drove high-powered cars appealed to him as heroic figures. He had not endured economic privation in his youth, and there was no present threat to his subsistence. Another patient was intelligent and had been schooled in a technical vocation but his anxiety severely handicapped him in taking up that field of work. He got along peacefully working on the family farm; but his goal was to engage in stock-market gambling as a means of getting money without too much work. He had the deterrent example, however, of his father, whose speculations had earlier imperilled the security of the family.

Not in our own series, but in a patient reported by Harms (24) is the curious instance given of a funeral director whose neurosis prevented him from assuming the solemn mien which his calling prescribed; he had instead the impulse to laugh at funerals, which was of course socially intolerable, although hardly less appropriate than the required attitude of fictitious grief.

In these few instances it appears that the usual evaluations of work were subordinated to other values, such as economic independence, devotion to the family, and attainment of wealth with minimum effort. It was apparent also that the avoidance of anxiety, which was inevitable in the complexities of routine work was another powerful motivation towards their adopting conventionally disapproved goals. We do not know how great a part mere expediency plays in the choice of socially acceptable enterprises. There is, apart from our case studies, much to provoke the suspicion that fear of punishment is decisive in deterring many men from looking for wealth and security through engaging in actually illegal activities. We may summarize the discussion to this point with the comment that in our culture men must work, and that in general the obligation is a largely internalized one.

In view of the very common complaint of uncongenial work, we found surprisingly few examples in our series of patients of evident direct connection between the work itself and the development of neurosis. The form of the work might be disturbing because of its actual danger, unhygienic surroundings, offensive administrative measures, disagreeable associates. In addition the literature on occupational psychiatry makes frequent reference to the fragmentation of the products of work (25) and the tempo of production. G. Pedersen-Krag has commented on the destructive influence

of the atmosphere of mass production with its symbols of powerful forces which revive infantile fears in the unconscious area. (26)

These problems are briefly alluded to in the histories we studied and those which we ourselves obtained. The unfriendly dictatorial boss was a threat to the security of some of our patients who saw in this situation a repetition of childhood struggles with or over authority. Perhaps because we did not see many factory workers, there were no specific complaints of dissatisfaction with the fragmentary nature of the products they made. It is likely that workers today are not at first hand aware of the loss of satisfaction that was once present in the making of a finished production. On the other hand, a group of our patients who had to continue the management of businesses which came down in the family expressed detestation for this uncongenial work. This appeared to be a matter of personal preference rather than of actually unfavourable surroundings.

Of the three general economic problems, insecurity, competition, and work, which we studied in investigating our patients, the type of work was the least apparent source of neurotic disturbance. It is tempting, however, to speculate about this. If work was not pointed to in a positive way, it may also be that in a large group of persons, apart from those fortunate enough to be able to express their needs by means of their work, the occupation provided insufficient gratification and was hence negatively a cause.

(c) Effect of Neuroses on Work

The second question is asked, "Did their neuroses affect their work?" Here our findings indicate that the occupation provides a significant field for the operation of neurotic behavior. The enactment of neurotic feelings may indeed account for some of the problems of business. On the other hand, when neurotic feelings are controlled, work appears to be very important as a partially sublimated or elevated expression of emotional needs. This was true even in the case of some patients who professed no particular interest in their jobs.

For example, G. worked as a draftsman in a plant for nearly twenty years. He was too insecure ever to assert himself to his superiors and he believed that his present wage was the maximum he could attain. His personal interests, aside from his absorbing work, were expressed entirely outside the plant. His neurosis, however, included obsessions and compulsions that drove him to extremes in scrupulous adherence to rule and routine. Outside the job he was always in danger of anxiety because the hours of leisure could not be governed automatically enough and the threat of ungratifiable wishes was constant. He particularly hated Sundays. At work he was contented most of the time because his needs for submission to an inflexible authority and for systematic routine were amply gratified. He welcomed overtime employment and obviously enjoyed the inventory periods that required his presence at the plant over week-ends. In addition this man enjoyed his work because part of it enabled him to exercise

domination over other employees. Within this framework, the situation was provided for a really timid, retiring man to indulge in the acting out of a fantasy of a grandiose character.

Persons whose work is excessively demanding and who seem to accept the situation whole-heartedly are often suffering from serious neurotic symptoms; but their drive to work accords so satisfactorily with the accepted conventions of society that the illness may not be evident. A plant manager who developed symptoms of frankly aggressive impulses—directed consciously against members of his family whom he feared he might injure—lived all his waking life with the ideal of high ambition and “getting to the top”. He had a large staff of subordinates whom he treated as a potentially mutinous crew, but he also did not spare himself. He relaxed rarely from the pressure and put in a lot of overtime. He accounted for this by his desire to get for his family the advantages he had had himself. It was when he learned definitely of an approaching advancement that he suffered severely from his obsession by destructive impulses. Previously his intense aggressiveness had barely been kept in check.

It is of interest that in these patients neurotic activity on the whole was put to constructive ends, although the degree of damage to others in their personal relationships can only be guessed at. Of course ambition and energy at work are not generally symptomatic. At least often, if not as a rule, the urge to produce is experienced as part of a series of pleasurable impulses, and is sufficiently integrated with the total personality to make work relationships harmonious. Ives Hendrick (27) has emphasized the importance of the gratification derived from mastery of the environment as a basic result of instinctive activity. Our society, however, approves of work without regard for its motivations.

Apart from these examples of the expression of emotional needs through compulsive work, we saw in our patients other kinds of fulfilment, and, of course, other unconscious pressures. There is evidence of the importance of work as a gratification of aims other than self-support or the maintenance of security and status. Our cultural prejudices place favor on such attitudes as “living for one’s work”, but certain neurotic patients give us farther insight into the meaning of this attitude. In those persons whose lives are centered in work, its sublimatory function has at this time failed, but we are able from their histories to reconstruct what the function has hitherto been. Here, as is seen elsewhere in clinical medicine, the pathological state, through its exaggeration of some functions at the expense of others, throws light on the healthy processes.

Some types of work more than others afford this gratification. It is a ‘consuming interest’ and these persons are ‘in love with’ their work. It might be said that all good work has this virtue, since in health the product of one’s efforts is potentially a source of pride and satisfaction such as is obtainable in personal relationships. What is loved in it also may be a representation of one’s self. On the other hand, in the work of certain

school teachers and nurses, both the work and the persons who are served may be equally important objects of love.

Two of our patients were very successful women professionally who enacted in their work the drives which in other spheres of their lives ended in unmanageable conflicts that precipitated a neurosis. One, a school teacher, succeeded in directing her strongly aggressive trends productively in her own schooling and later on as a teacher. Socially she was unsuccessful and unhappy. The second woman, an artist, was a very extravagant and flamboyant person who showed these characteristics in her work and also in the financial dealings around her work. It would be impossible to separate these characteristics from the work itself and from her success in it; but they were connected also with her periods of extreme financial economic insecurity and the neurotic relationships with others in which she was involved.

Not all of the patients could express their needs so satisfactorily, however, in their work. In other cases we saw the influence of the neurosis rather in the steady deterioration of the work as their anxiety increased. This, indeed, is the more common situation. Satisfaction also progressively diminished and what had been in some cases a refuge from intolerable personal conflicts failed to provide further help.

In addition to Hendrick, other psychoanalysts have written on these sublimatory functions of work. Menninger (28) emphasizes the draining off of aggressive impulses, a point on which all the psychoanalytic writers appear to agree. To be satisfying, however, there must also be an element of interest in the specific employment; drudgery by itself does not afford this kind of release. One might remark that the interest must be present in the first place; then the actions involved—all work demands some type of action, mental or physical—can be directed toward a gratifying end. Hart (29) lays stress on its integrative nature. It is not merely an 'outlet', but serves to organize the effort that is discharged into a synthesizing effort. It operates to reduce human conflict by a direct satisfaction, by providing acceptable outlets for aggressive and destructive drives, and perhaps more importantly, by encouraging the worker's continuous adaptation to reality. That of course is what characterizes good work, and what is denied by work that is unhealthy. Hart also recognizes the 'need to please' as part of effective motivation.

When we speak of the sublimatory function of work it is essential to bear in mind what can be sublimated and how this occurs. This is by no means a process that is well understood. The general connections are fairly clear, and that under the leading of the incorporated social values represented in the superego, the biologically based life-drive is directed by the ego toward socially useful (or at least tolerated) aims. Intelligence, experience, and other factors must be called upon to explain the diversity of means whereby drive is sublimated. These sublimations are among the most valuable of human activities, and therefore are among the most subject to value judgments.

Analysts have emphasized various drives as the source of the sublimations found in work. Zilboorg (30) has stressed retentive drive, which in the psychoanalytic scheme is connected with the destructive drives that Menninger has referred to. On the other hand, Bartemeier (31) has been principally interested in the connections obtaining between work and eating, with special reference to the infant's first 'work' in the shape of his early adaptive responses in the nursing process. As we have seen, Hendrick and Hart move the center of the discussion from the drives to be sublimated to the integrating functions. They show how work utilizes instinctive drive in a special way, not merely permitting discharge of tensions but affording purposeful direction and organization of the drive.

It is not necessary here to assume that there is any contradiction in these various views, which complement each other and which all bear upon the principal issue: that in work a large and complex series of human needs and efforts is manifested. These needs may or may not be neurotic needs, that is, they may or may not have already become deflected from the aim of satisfaction. Loss of work, or inappropriately assigned work, or that which becomes inappropriate because of fortuitous interpersonal strains may result in the return of these instinctual needs to their more primitive outlet or may result in symptoms.

II: COMPETITION

We have already referred to the significance of economic competition as one of the possible factors involved in the genesis and precipitation of neurosis. This topic has particular interest because of its intimate association with other elements in the development of neurosis. The attainment of individual ascendancy through competition is not limited to the economic sphere; traditionally, this is a major value in other activities such as war, sport, artistic production, and religion. Economic achievement, however, at least in our culture, holds an important position as a demonstration of individual superiority. The classical discussion of this is to be found in the work of Veblen (32) although it has been studied from other points of view, and in particular has been related to the values of the dominant Protestant ethos. (33)

We have also emphasized the importance to the healthy individual of conformity to the ideal of participation in useful work, and we have described a mechanism whereby social values are acquired. The expected social role (34) of the person in the culture includes certain proprieties among which is success, which may have a fundamentally economic coloring. Achieving, attaining, obtaining, and displaying are demonstrations of personal superiority, all of which imply competition with other persons engaged in the same pursuit. The possession of wealth and economic status is regarded as valuable in itself for the personal enjoyment which they provide; that is, comforts and luxuries and guarantees of security. Maintaining the economic proprieties is an act of allegiance to social values,

conscious or unconscious, the outcroppings of which are rationally covered by references to material needs, taste, and preferences, as well as security.

In Ackerman's words, (35) "the effect of integrating a particular 'social role' may exact an excessive price in terms of anxiety and conflict within the individual self; or conflict within the individual may damage or actually prevent effective execution of a given social role". He further comments on the special trends in our culture tending toward strain and anxiety and the arousing of hostile competitive feelings. When we consider the economic problem with regard to insecurity and threat to survival, we conceive the hardship as external, much like the threat of being starved or otherwise annihilated. We see also in economic hardship the setting up of a threat from within, the threat of failure in the eyes of one's fellows, and hence one's self. This sensitive relationship, between social values exacting economic success and the self-esteem of the individual, makes competition likely to contribute to the development of neurosis.

Horney has specifically indicated the social phenomenon of competition as causal in the development of the neurosis. (36) She describes the nature of neurotic competitiveness, and then correlates it with the over-evaluation of success in the culture. The neurotic, according to Horney, who uses this over-all designation, exaggerates the importance of success and hence of competition, and so unconsciously induces the failure which he so emphatically seeks to avoid. Neurotics also experience the success of others as indications of their own personal failure. They demand not simply successful attainment of their goal, but supremacy over all others. Such grandiosity is inevitably accompanied by fears of retaliation. Neurotics therefore must be inhibited in all efforts toward achievement, since their very grandiosity begets anxiety. They defend themselves from competition by feelings of inferiority.

Horney then inquires into those elements in our culture which may contribute to this kind of character development. Her principal emphasis is on the predominance of competition in all social life, including the economic. The goal of success is imposed without regard for the fact that possibilities of its attainment are limited, and furthermore, that the activities necessary for success are by no means necessarily consonant with the recognized virtues of the culture. She concludes therefore with the suggestion "that neurosis is not due simply to the quantity of suppression of one or the other of instinctual drives, but rather to difficulties caused by the conflicting character of the demands which a culture impresses on its individuals".

It is of interest parenthetically to compare Horney's view with the concept of *anomie* which Durkheim introduced in his work on suicide. (37) Durkheim also stresses the discrepancy between the expectations aroused by the society within the individual and the opportunity afforded by the society for their fulfilment. The result of this discrepancy, he found, was a state of confusion or *anomie*. In modern life there is constantly arrayed before the imagination of the individual the possibility of a greater economic success than his fellows' and within him a feeling of obligation to attain it.

Thus the external conflict of activities toward attainment is reflected inwardly in emotional conflict. Green (38) summarizes this point of view succinctly: "Perhaps the most dominant personal motivation in modern society is individual success, with unlimited class mobility, but it happens to be accompanied by well-nigh universal frustration."

One of our patients was a salesman, T., in a highly competitive business who had obsessing fears of being unable to produce a large enough volume of sales. These fears spread to all-pervasive doubts of his ability to function and support his family, with ensuing profound depression. An immediate stress precipitating this illness occurred when a fellow salesman whom he had previously assisted now had a superior situation and, having passed him by, had forgotten his indebtedness. There were additional complications. T. had remained in this business to a great extent because it was one owned by a relative. He felt in some ways more secure here because there was no danger of losing his job, and he was protected to a certain extent from competition. However he was intensely envious of the owner's success and was often aware of frank wishes to defeat and destroy him. This was not unprovoked, since the owner of the business made and did not fulfil promises of advancement.

But deeper study of this patient's conflict revealed interesting connections. The basic repeated theme in his feelings was his shame at being "not a man". Doubts of his virility were present throughout his adult life and he reacted to these doubts with promiscuity as well as with his intense need to succeed in his work. In business as in the instinct life he had a constant need to overcome this feeling, but he could never succeed in developing adequate conviction of his masculinity. His doubts of his virility in turn were traceable to his early failure of identification with his father, or other suitable masculine figures. Even in childhood he showed reactions, anticipatory of his later behaviour, in the development of minor delinquent activities.

At this time economic insecurity may have played a part in establishing an unhealthy family setting. His family's poverty contributed toward separating him from his father who had this reason to be absorbed in business, leaving the boy with his mother toward whom he was deeply attached and overdependent. This childhood relationship with his mother with all of its dangers to his development of independence was further reflected in his attitude toward women generally. His promiscuous behavior was determined not only by his attempts to deny his doubts about his masculinity, but also by his need to keep sexual gratification apart from his relation with any woman with whom he could have the emotional satisfaction he had earlier experienced with his mother.

The interweaving of instinctive conflict with the opportunities for its practice in economic life is well illustrated by this case. More specifically it connects strivings toward the representation of masculine behaviour with economic competition. This is not the only instinctive problem which may find its issue in competition. A series of our patients presented neurotic

symptoms in which the economic problem involved was their participation in an inherited business. There was in these no obvious precipitation of the illness through economic insecurity or through unusual striving for the attainment of wealth and prestige. The competitiveness which could be recognized as of neurotic significance in these patients arose from their earliest familial relationship which the business continued to represent long after the maturity of the patient had been reached.

J., a man of forty, was depressed and preoccupied with bodily symptoms for which no organic cause could be found. He attributed his illness in part to his dissatisfaction with his business, which was very successful, but which he insisted did not interest him, and which he had made a number of attempts to dispose of, always desisting because the firm meant so much to his mother. His father, who had founded it, had died when the patient was a boy, and his mother had never allowed him to consider seriously any other occupation than that of maintaining the firm. He conformed to her will in the matter, but within himself there was a persistent struggle between his efforts at rebelling and his inability to disagree openly with his mother. He had never been able to feel that this was his own responsibility, because he had inherited it and he looked upon his own success as merely continuation of his father's; he felt frustrated by the persistent power of his father's influence. His close although ambivalent relationship with his mother, together with the material advantages gained by continuing the inherited business, actually removed him from the field of competing on equal terms with others. At the same time his dislike of the work and his diminished self-esteem were closely connected with the fact that he was engaged in hopeless competition with his dead father. Implicit here was his requirement, derived from values of the society, that he achieve success independently. He injured his self-esteem by maintaining this business, in which he felt he was denied any really independent expression; but he refrained from selling it because of the economic security it provided and the bond with his mother which it involved.

Our patients' histories prevent us from attributing their problems of competition solely to the overevaluation of success and prestige which our society makes. These social values are incorporated at an early age, since the assumptions on which the parents' lives are organized and which therefore modify what they say to and do with the child include acceptance of the values of competition. Our evidence is that such indoctrination falls on prepared soil. Competitiveness exists by the very nature of the organization of the family. The demand of the child for exclusive possession of the family. The demand of the child for exclusive possession of the family. The demand of the child for exclusive possession of the family. Some the primary sources of competitiveness in the life of the individual. Some the societies such as our own may be more adjusted than others to invoke the competitiveness that is ultimately grounded in the family. The clinical importance of this can be recognized when we recall that in many patients competitiveness as a neurotic symptom has only incidental economic appearance and it is more readily detectible in, for example, the sexual life.

The interweaving of personal and economic competitiveness is demonstrated in the case of W., the forty-year-old employee of a shipping firm who came for treatment because he was depressed. It may be profitable to examine his case in some detail. His depression had begun after he was transferred a year before to another port where the firm was engaged in shipping operations, remote from the city where he had lived all his life. At the beginning of the new enterprise he was simply a little uneasy at moving so far from his old home, but accepted the position with its attendant increase in responsibility and rise in salary. He worked hard and successfully, but with ever-increasing anxiety that he would not be able to carry out the important duties entrusted to him. His anxiety centered around the fact that he did not have the equivalent of the training of many of the men with whom he was working, having come into the business as a young man out of high school and gradually working up to higher positions. His technical knowledge was excellent, gained from many years of experience, but he always felt that some new man with advanced training might appear and supersede him. The new work, in addition, was one of intense pressure, making new demands upon him as well as, of course, on all the other persons in the firm. He was no longer able to discuss his work with the older brother who had helped him at the beginning of his career and to whom he had always turned for advice. This brother had continued to live in their home city where he was a wealthy lawyer.

As time went on W.'s anxiety increased, he became tremulous and looked ill, and was intensely afraid that his anxiety would be noticed. He asked finally to be returned to the place where he had previously worked. Unfortunately this could be granted only if he would be willing to undertake work with which he was unfamiliar and to accept a much lower salary. He felt that his unhappiness was desperate enough to warrant the move, and he accepted the condition. He had no sooner moved with his family and entered the new position than he became profoundly depressed and found it impossible to do any work at all. At this time he came for treatment.

Both the patient and his friends explicitly accounted for his illness in terms of an exclusively economic determination. In the old position he was overworked and then, being forced to take a new position at lower pay, he lost status and security and was therefore depressed. The initial signs of his illness, however, began with a promotion and not with a lowering of his position, although it was accompanied by a transfer to a new home and place of work. This phase of the illness alone progressed to the point of virtually incapacitating him. From this point of view it looked as if we could best understand his problem as a direct response to advancement, a 'promotion depression'. The treatment, on the other hand, brought to light additional information that altered the picture considerably.

A principal topic of preoccupation was his relationship with his brother, who from early life had stood in the place of father for him and whom as long as he could remember he had looked on as an ideal person. Despite early poverty the older brother had managed to get through law school and

by his very considerable ability and aggressiveness had achieved great success. W., however, became early interested in the shipping trade in which he also prospered, but not with the rapidity or to the degree of his brilliant and energetic brother whose attitude had always been one of condescension toward the little boy he had protected and dominated. Throughout the years the patient's actual dependence on his brother had of course diminished; but the strong emotional tie persisted, so that he would never take any major step in life without prolonged discussion with him or without his encouragement. When W. returned home from his unsuccessful venture, he was greeted by his brother's obvious disappointment, and when he failed to accept the new position he met with frank hostility. His brother was ashamed of him, he thought, and he felt he had disgraced himself.

At an early point in treatment W. showed intense anger towards his brother, which turned out to represent the accumulated resentment of the years. Even as a little boy his admiration of his brother had been colored by feelings of a negative kind. His brother was closer to their mother than he, and it was necessary for the patient to be in his brother's good graces to be sure of his mother's favor. In recent years he had again incurred his elderly mother's displeasure and he had again had to seek his brother's intervention. Despite his own achievement he was persistently aware of the greater success of his brother which he somehow connected with the brother's closer intimacy with their mother. W. had always struggled with his feelings of hostility toward his brother, much of the time denying them, even to himself. He partly subdued them through his acceptance of the subordinate role as long as in actuality he was advancing in his work. At this particular time he could no longer hide his frankly hostile feelings.

It is of interest that during the period in which his neurosis was beginning to become manifest he was greatly preoccupied with the danger that younger men, more skilled than he, would come and usurp his place. This fear was the reverse of his own barely checked wish to overthrow his brother's domination. The important element in W.'s case is that his success at work was at once enormously overvalued and chronically imperilled, because it represented to him his principal means of channeling simultaneous feelings of regard and hostility toward his brother and sister. When he gave up his job and returned to his old home, the discrepancy between his ability to perform and his ideal of performance was confirmed.

It should be stressed here that even in the relatively brief treatment this patient had, other themes than those which we have followed up in detail were of importance. It is possible that one or another of these themes might have been of preponderant causal significance, especially if we had a more complete knowledge of the unconscious mechanisms involved. Nevertheless in this case the economic situation clearly precipitated the illness, operating in fact at more than one level to do so. In addition to the deeper problem of the patient's relationship with his brother, the change in location of his

job, the initial promotion and the subsequent demotion, and the intensive pace of the work were all instrumental in bringing about his illness.

Thus far our cases have illustrated for the most part the drive toward economic success as a value in itself. Others of our patients in whom economic strivings were intimately related with the neurotic behavior were overconcerned with economic matters because of their great need for social prestige. Although there are exceptions to the rule, namely, in traditionally upper-class families and in some intellectual circles, it is generally true that social status in America is closely geared to economic position. Therefore where there are intense needs to improve social status there will be in many persons a corresponding need for money. A related condition is that in which the maintenance of social prestige is imperilled by economic insecurity.

A young woman, E., who had been brought up by a family that tried to live up to certain aristocratic social ideals was faced from early childhood by the marked discrepancy that existed between her economic capacity and the social position she had learned to expect. E.'s family were severely affected by the economic depression, but apparently even before that her father's financial irresponsibility kept them in financial straits. Her mother particularly suffered from the deprivation of social position that resulted. On the other hand there was also the loss of luxuries and comforts that had been so highly valued by them, although it does not appear that they were ever in want.

In her marriage, E's husband's lack of conspicuous success as an earner was doubly disturbing to her because she had tastes for expensive things she could not afford and also needed to regain the lost social position of her childhood. It is interesting that in the course of her treatment E., in addition to gaining a degree of insight into the conflicts, also showed a favourable response when her husband's earnings improved, and she could to some extent gratify her economic needs.

We saw a rather similar situation in another patient, S., whose upper-class mother had married far below her class. S. seemed all her life to be attempting to overcome this disgrace. She abandoned a lover for a man of more 'respectable' position whom she married, and by whom she expected at last to be given economic self-sufficiency and restoration to the social class to which she felt she belonged. It was a very disturbing experience for her when she was disappointed in both. This woman had a ceaseless preoccupation with money, which for her seemed to have the principal meaning of insuring social respectability. Without it she had to see herself in the image of her disreputable father on whom her mother had "thrown herself away".

The connection between money and social desirability may be recognized quite early in life. Some of our patients remembered humiliating experiences in childhood when they were made aware that their lack of wealth somehow made them less esteemed people than wealthier neighbors. The patient R., who was mentioned at an earlier point because of his unusual

lack of a sense of responsibility to work, was also aware in childhood of this distinction. At the age of six he contrasted his family with the neighbors and felt that his family did not live in a good enough house. His strivings for upper-class living seemed to have begun then and remained a primary motivation throughout his life; spending large amounts of money was his major satisfaction to which all other gratifications were subordinated. Actually R.'s family was rather well-to-do, and the usual response of his parents throughout his life was to give him money and other material objects. This man whom we have seen to be psychopathically irresponsible could apparently recognize relationship only in terms of the money involved in it. Obviously this was not the only cause of his irresponsibility; but we are able to see through this, understanding that behind the fanatical interest in money lay an attempt to establish some lasting relationship with other human beings. His social snobbery in turn was predicated by his contempt for his parents.

All three (E., S., R.) demonstrated quite different processes in which the neurotic meaning of money was involved. They could not do without money, much more money than they could readily get and this not for the purpose of gratifying material needs or obtaining pleasure. In the two women, and to a lesser extent in the man also, the obtaining of money had as a principal aim the overcoming of situations of insufficient social prestige. This problem may also be looked at from the point of view of security. Not only falling in social position may be a threat to emotional security, but also failing to rise, in the case of persons whose morale requires of them that they advance socially. Such an aim in life is of course offered by our society to all who enter it at birth; but only in some does it become a neurotically determined need. Our evidence would be to the effect that this need develops in persons whose early character formation encourages striving, envy, and other mechanisms of 'getting' and 'winning' and 'keeping' that have their origin in the rivalries of childhood. The fitting of these mechanisms into the framework of social striving is probably the result of certain identifications made in later childhood, when the object of interest and envy is a person with real, or fancied, social prestige. Because of the connection that exists between economic position and social prestige, money becomes in these persons an intermediate object.

Psychoanalytic studies, however, add to these observations the recognition of deeper needs which are involved in the getting of money. Since as far as possible we have kept in this paper to the type of evidence which our own patients have presented, we shall not discuss this at length. It suffices to say that from a wide range of studies there has come abundant evidence that money has other meanings. Depressed persons, as has been suggested at an earlier point, may see in money the symbol of their direct means of sustenance; loss of money is loss of food. In other instances, persons have been studied who need primarily to keep money, or its equivalent in the form of valuable objects; in these persons the unconscious drive is one of retention, and had its origin in the primitive instinctive response of the

child to retain his feces—as material of fantasied value, because of the significance of the stool during the process of training of the child. Further connections of this anal attitude toward money with other anal attitudes are to be found. Wishes to soil and wishes to hurt likewise proceed from this period of the child's development; correlated as they are with aggressive aims, it is possible to see how the striving to get and keep money may realize many unconscious goals at the same time. Not only is there both real and imagined security in money; having money and getting it by competitive effort are also gratifying to primitive needs of a destructive kind. Conversely, in so far as our society encourages competitive effort (as all industrial societies do) it automatically places a high value, in terms of both actual rewards and of esteem, on the working out of destructive impulses in economic life. Many psychoanalytic writers have commented on these phenomena. (39)

III: CONCLUSIONS

We have ranged widely in this study, examining topics connected with one another only by virtue of their common reference to the inter-relationships of economics and neurosis. We have been impelled to do so in following the leads given us by the study of a large number of case records; the application to the records of a broad criterion of what constituted the economic life of the patients encouraged this approach. The patients whom we studied had many different kinds of economic experience and their responses to them were also greatly varied. We had information about them differing in psychological depth, so that the interpretations which could be made, pertinent to our subject, were not strictly parallel.

A first generalization which work of this kind permits is that economic life can be shown to have great significance as a determinant of neurosis, provided that an adequate investigation of the economic situation is made. In other words, what persons do to earn a living, what kind of experiences they have had as a result of their parents' problems of earning, what kind of economic mores of the community have been imposed on them—such things constitute definable elements in the development of neurosis.

We made the more or less arbitrary division of our subject into inquiries concerning security, work, and competition. The major economic issues in the lives of the patients could be subsumed under these headings, and the pertinent literature could also be surveyed in this way.

The level of interpretation as an index to the significance of economic determinants was found to be very important in all the topics under consideration. That is, the role of economic issues in the lives of the patients may be seen in different perspectives, depending on how much is known about other areas of life. On the subject of *security*, for example, the literature covering the statistical examination of large populations supports the conclusion that poverty and economic insecurity generate or precipitate neuroses. Here the single determinant is isolated from, among other things, the character trends of the individual person which foster, or defend him

against, neurotic experiences. A superficial personal history may similarly isolate the economic from the characterologic problems of the individual. Conversely, the pursuit of psychological depth often obscures evidence of the relative importance of social and economic agencies.

Under more favorable conditions for study, however, the finer type of scrutiny which is permitted by a detailed case history oriented by psycho-analytical psychology sharpens our view of the interweaving of economic factors with conflicts within the individual. Exclusiveness of economic insecurity as instrumental in producing neurotic behavior is not observed; on the other hand, what are presumably personal conflicts unrelated to economic insecurity are seen sometimes to have themselves originated in childhood situations where poverty and deprivation played a part.

Our observations confirm the view of other writers that at least two factors are involved in the generating of neurotic behavior by economic insecurity: Not only is the threat to subsistence of serious consequence, but so also is the threat to self-esteem. Greater and lesser degrees of neurotic behavior resulted when insecurity and poverty defeated the individual's attempt to live up to the expectations they made upon themselves. Furthermore the psychological correspondence existing between economic insecurity and loss of love was illustrated in our cases.

Work as a stress situation could also be looked at from more than one point of view. References to the occupation as a source of emotional disturbance were not frequent in these cases. When they did occur, the specific meaning of the stress could be found in the transfer of more deeply determined personal conflicts into the work situation. This of course does not diminish the importance of work as a stress, since this part of life accounts for such a large amount of the time of any person's activity in association with others. On the other hand, for some of the patients whom we studied, the employment provided a demonstrable release for energies which were themselves directed by neurotic conflict. Some of the psychological mechanisms whereby this release may have occurred were discussed, and the literature was approached for theoretical explanations. Evidence was further at hand to show how the cultural evaluation of work may provide a screen of acceptability for compulsive overactivity—the neurotic nature of which was evident only after the person became ill.

We were impressed by the importance of *competition* as a force in the histories of some neurotic persons. Economic competition operated as a pathogenic agency in several ways. The struggle for achievement liberated in some patients feelings of hostility which were poorly withstood. In other cases the culturally prescribed standards of success and prestige presented goals impossible of achievement, which augmented already existing conflicts. In yet others, economic life offered a new arena for the enactment of competitive struggles which had been going on in one guise or another since early childhood. In all these it may be said that the obligation to compete, like economic insecurity, had a double function: it was a direct

threat, since failure might again endanger subsistence, and it was also more subtly involved as a social force, invoking the individual's allegiance in the pursuit of a value not open to criticism.

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Motives of Workpeople who Restrict their Output*

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THE field work for this study extended over about eighteen months, from 1958 to 1960, in a North-country mass-production engineering factory. It was a medium-sized organisation, one of a large group operating in a buoyant market.

RESEARCH METHODS

The project did not seek to test hypotheses, but was exploratory in conception, taking as its subject the behaviour of those employed in a particular workshop which was the origin of production flow through the factory. The complexity of the work situation, where any human response occurs amid an entangled profusion of interdependent variables, suggested the use of a variety of research methods in the hope that these, by throwing light from different angles, would maximise the total illumination. So a multi-method approach was undertaken.

Apart from an initial meeting with the Works Manager and Personnel Officer, the first contact with factory personnel was made by 'participant observation'. The investigator was introduced to the shop foreman and, at his own insistence, supplied with dungarees and set to work—unpaid—on the casting of molten metal by hand. The foreman brought the shop steward over for a chat, and in conversation with him and with the workers with whom the investigator mingled it was explained who the investigator was and where he was from. It was stressed that he simply wanted to get to know everybody and everything that went on in order to understand the workshop. The advice followed was that of Katz (1953) to 'spend considerable time in participant observation' in the 'scouting' phase, for though this entails what may be a comparatively slow and unproductive start to field research it may pay off subsequently in greater co-operation and a fuller knowledge of the place and the people against which to assess other research data. The participant observation was 'open', as distinct from the concealment resorted to by some American observers who have not revealed their identity and as tried unsuccessfully by Mumford (1958)

* This paper is derived from a thesis presented for the degree of M.Sc. (Tech.) and later deposited in the Library of the University of Manchester. The research was carried out, under the guidance of Mr J. A. Fraser, industrial psychologist, when Mr Hickson was a research student with Professor R. W. Revans, Professor of Industrial Administration in the University of Manchester. He wishes to acknowledge also the helpful criticisms of the draft of this paper by Mr D. S. Pugh of the Birmingham College of Advanced Technology, where Mr Hickson is a College Research Fellow.

in this country which led her to advocate adopting "a general role, *e.g.* student or research worker, and the securing of the group's permission to participate in its activities". The method avoids the strain of maintaining a subterfuge (and the contingent moral issues) but can achieve a high degree of participation in group activities. As other observers have found, memory recall of significant items of behaviour or snatches of conversation improved markedly with practice, insofar as this could be subjectively gauged, but the customary note-taking in deserted changing-rooms or on the way home after a shift was essential to collect a mass of information that could later be analysed. Participation in the hand job lasted for six weeks.

As a result of this preparatory observation, it was decided to concentrate study on a group of men working machines over the gangway from the hand-worker group. Several meetings were held at which the project was explained to them, and to interested members of the management and to stewards, in the sort of general and non-committal terms already indicated. Three weeks were then spent in continuous observation in the machine group, though as there were no spare machines and the job required greater skill than casting by hand, participation had to be in terms of assisting with ancillary tasks and not actual machine operation, other than keeping a watch and making adjustments while a workmate nipped out for a smoke. Observation of this kind continued to be used for frequent periods of a few days at a time during the succeeding several months, and for more than a year it was supported by almost daily visits to the workshop to stand around and chat with all and sundry. In addition, permission was obtained to attend various meetings, both managerial and joint, and constant fact-finding calls were made in management and staff offices.

Other data were obtained by analysing all kinds of factory records, from length of service to individual output, from current earnings to memos linking up the tortuous history of the application of the payment system, and so on. A small attitude study was carried out by non-directive interview (in working time) of those line managers and supervisors with formal responsibility for the work group studied, of the works convenor and the steward of the shop, and of the members of the work-group itself and some of the nearby hand workers: in all, there were 36 interviews.

The use of more than one research method did enable data from each source to be cross-checked and put together to make up a more complete picture than might otherwise have been obtained. Whatever the self-discipline of the researcher, participant observation can produce only the uncorroborated perceptions of a lone individual: but confirmed by factory records, for example in respect of output, and supported by interview information, it is less assailable. Nonetheless, it did appear that response in the interview situation was probably inhibited, and perhaps slanted, by the prior acquaintance of interviewee and interviewer on the shop-floor or in the office. Probably some subjects felt that having previously chatted with the research investigator on the job there was no point in sitting down for the specific purpose of talking to him again. This impression appeared

to draw some support from an analysis of the length of interviews, showing that the machine-workers who knew the investigator most closely averaged least time with him as interviewees:

Here is something of a dilemma in research method. While on the one hand it may be said that observer and interviewer roles should be performed by different individuals so that the risk of this particular inhibition and of carrying pre-formed attitudes into the interview room is removed, it can on the other hand be argued that an interviewer with an intimate knowledge

	LENGTH OF INTERVIEW, IN MINUTES	
	AVERAGE	RANGE
Hand Workers ..	37	25-55
Supervisors ..	36	30-40
Middle Management	32.5	15-60
Machine Workers	29	20-45

of the workshop can quickly follow the more subtle implications of what his subject is saying, as related to the total work situation. An optimum compromise might be for an interviewer to be supplied with descriptive information by a research colleague who had previously acted as a participant observer.

THE GROUP STUDIED

The group of semi-skilled machine-workers which was the central subject of study was numerically small, eighteen men in all, and these split into three shift sub-groups of six men each successively operating the same equipment on eight-hour turns round the clock. These men were also a minority in a shop where the majority were employed turning out the same product but by the older hand process. Though the machines were a recent innovation, this was in no sense 'automation', for the men who worked them were able to control the quantity and quality of output. Those on the machines took a pride in their skill, for not everyone who had tried the job had been able to adjust to its demands. This, and other indications such as relatively high earnings, modifications of the pay system in their favour, and the attitude of other workers and of managers toward those who were on mechanised production, showed that these men were accorded a comparatively high status in the estimation of groups both above and below them in the unofficial status ranking. In fact, this rank position, and the earnings that were permitted the men in accordance with it, were out of line with the official or formal ranking explicit in the grading system, *i.e.* the informal status was higher than the job grade implied. As for the men's economic value for the organisation, ultimate production of the staple lines throughout the factory depended in the first instance on the components coming off this battery of machines; and so the men were conscious that theirs was the job of the future on which all else hung and they had no fear for the security of their employment. Indeed, management urgently wanted more of these vital components.

RESTRICTION OF OUTPUT

It was clear early on in the investigation that a feature of the behaviour of the machine-workers was group 'restriction' of output. Before going further, the use made here of this expression 'restriction of output' should be defined. It is intended to mean the behaviour of workers who, acting in concert, set and maintain standards of output below the expectations of management, and below the standard that they themselves believe they could maintain. This definition is derived from the form of words used by Lupton (1960) in his broadcast on the subject, but expanded to specifically bring in the viewpoints of both the management and worker groups; because while the worker cannot be said to be holding back if his bosses do not want and expect more from him, the fact that a manager expects a worker to produce more does not necessarily mean that he can do so. The worker's recognition is required that he is capable of reaching and of keeping up a higher level of output, that is not just a short-term spurt. To include the term 'restriction' has the inherent risk that the impartiality and objectivity that is the aim of the research viewpoint will be prejudiced by the overtone of disapproval which can be read into the word, but nevertheless it is used here because it is commonly employed and understood both in industry and the academic world. No value judgment is intended of the practice itself.

Investigation of this phenomenon of worker behaviour was prompted by an examination of output records. It was quickly apparent that a 'ceiling' existed of 6,000 components per man per shift, a figure which was never exceeded by any member of the group. Figure 1 illustrates this with an example in the form of a frequency distribution of output from just one set of machines operated by three men on successive shifts: and taking 835 shifts on various machines, charted for periods in 1958 and 1959, the ceiling was exceeded only twice and both these instances occurred in unusual circumstances and were not truly exceptions to the rule. Then what were the limiting factor or factors? Since the machines were not designed with any set maximum speed, and experience as a participant observer gave no indication of any physical limit on man or mechanism, the probability was that the determining factor was conscious human control. The probability increased when it was found that on some machines which were of a slightly different design to the rest, and had a different 'time' or 'price' for the job under the payment by results system, the ceiling was not 6,000 components per shift but 3,600: a figure which nevertheless was equivalent to exactly the same earnings. Further evidence was gathered in the notes made after each shift as an observer. Significant phrases of conversation were noted as near as possible verbatim, and many comments were to the effect that "we fixed this ceiling between ourselves".

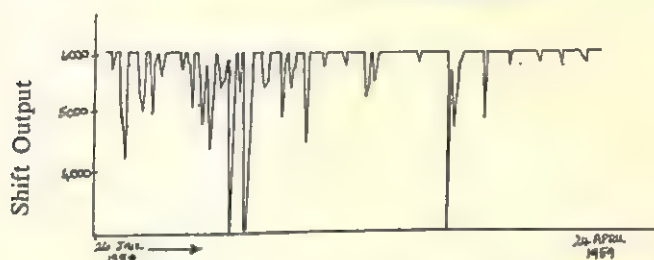
MOTIVATION

The question was why the group norm of conduct should be 'restrictive', in opposition to the organisation's official system of financial reward through

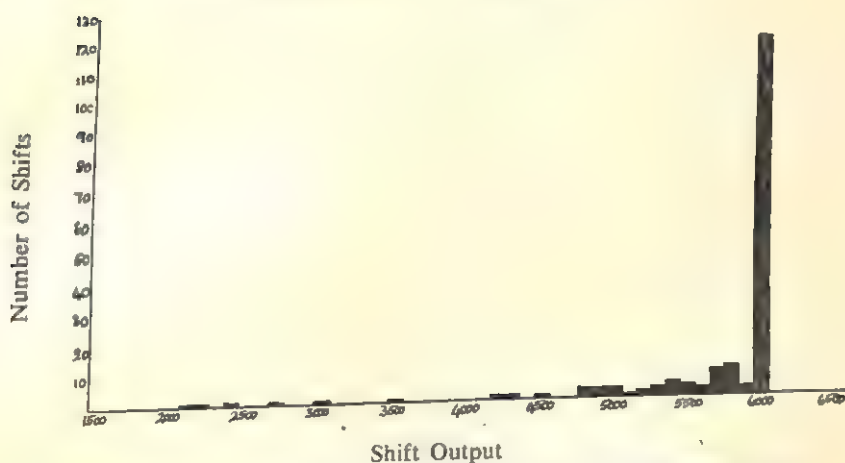
FIGURE 1: TYPICAL 'RESTRICTED' OUTPUT

(Output of 3 men on successive shifts on the same machines, 3 months Jan.-April, 1959)

(a) Output graph



(b) Frequency histogram based on (a)



(shown in multiples of 100: recorded by the men in multiples of 50)

individual payment by results, and to management's known wish for greater production to meet expanding sales. In other words, what were the motives of these men for this particular behaviour, for establishing such a norm and for such loyalty to it?

The motive most clearly indicated by the men's conversation on the job, and later in their reminiscences during interview, was found to be linked with a corresponding cause, or situational stimulus, in the system by which the earnings potential of the job was set. This job, like most others in the factory, was on individual incentive payment associated with time-study. A Standard Time would be arrived at and issued by the Work Study office formulated as a number of Standard Minutes (S.Ms.) allowed for a prescribed quantity of components. Since the cash rate collectively negotiated between the trade union and the employer was in a direct ratio to Standard Minutes, the more S.Ms. allowed the higher and quicker the potential earnings, and the less S.Ms. the less the potential wage packet. However, the machine-workers had a Time which was designated as Temporary, the significance of this being that it was subject to alteration at the discretion of manage-

ment, in theory at least. Following the customary practice in the engineering industry, Standard Times could normally be altered only by mutual agreement, or if obviously mistaken, or upon a change in the method of work, but these conditions did not apply if it were Temporary; which label enabled management to postpone final commitment to a Time if, for example, a new machine had not yet overcome teething troubles and attained the anticipated level of production. This was the position with the group of machine-workers, and had been for so long that the description as Temporary had ceased to have any meaning for them.

Then management changed the method of work, but left the Time as it was before. To the men the word 'Temporary' assumed a fresh significance. It now forewarned them that some day the Time would certainly be revised, perhaps unfavourably, so that the earnings potential of their job was no longer secure. Notes of conversations with the men on the shop floor, and the records of subsequent interviews, did not suggest any general distrust of management or fear of deliberate rate-cutting, but the outcome of a time-study and of any negotiations over it was bound to be uncertain, due to the subjective factor in speed-and-effort rating, and to the effects of what W. Foote Whyte (1955) has dubbed 'the guessing game' between rater and worker. So the men's present and future earnings were placed in jeopardy. As they pointed out, a few Standard Minutes either way could mean pounds a week for them. Moreover, though they did not refer to their earnings differential over other workers ostensibly in the same official pay grade, the well-known link between income and status may, nevertheless, have been an influence.

The response of the group to this uncertainty was informally to determine and adhere to ceilings on output. To quote just one comment: "... we had it in the back of our minds that something of this sort would happen and we fixed this ceiling between ourselves". But the relationship between managers and workers in this area of mutual interest could hardly be put more succinctly than in the dry remark: "If they give a Temporary Time they must expect a temporary score" ('score' meaning output total).

Behrend (1957) has coined the expression 'effort-bargain' to denote this relationship between the 'effort' offered by the worker and the reward offered by management under systems of payment by results. The concept can be used as an aid to classification of the findings of the major researches on restriction of output, including the Bank Wiring Observation Room at Hawthorne, S. B. Mathewson's widespread survey (1931), and D. Roy's study (1952), all of which have brought out motives of the fear of rate-cut or speed-up kind. Such motives can be regarded as apprehension for the future of the effort-bargain, as can the motive of the machine-workers in the present case who by 'go-slow' were guarding their position against an anticipated renewal of 'bargaining'. So a generic category of such motivation might be entitled 'uncertainty as to the continuance of the existing effort-bargain'.

It is a truism that no man acts from a single motive, and the machine-workers were no exception. For they found that in itself the practice of restriction afforded them certain satisfactions. To begin with, they shared the egalitarian belief that men on similar work should get similar pay, a value common in industry and recently stressed by Shimmin (1959) after her survey of six factories. However, the machine-workers did not all begin a day's work with an equal handicap, for on long-term performance they assessed some machines as 'good' and others as 'bad', a distinction that was verified by an analysis of output records showing 'good' machines averaging up to 21% better than the 'bad' machines, which often fell short of the ceiling quantity. No measure could be found to determine to what degree, if any, individual variations in ability contributed to this difference, but observation showed only that men on 'bad' machines endeavoured to reach the ceiling whenever mechanical vicissitudes allowed, and generally bore out the worker's opinion. Hence as men were permanently allocated to either 'good' or 'bad' machines, some had an advantage which was not of their own making or within the group's control; but the output ceilings, being also a limit on individual earnings, restrained disparities in wage packets within a range that was compatible with the group's egalitarian ethic. As some of the men said, if they had all worked flat out there would have been trouble between themselves, and also with management, because the inequity of men who had the same 'price' for the job being given outwardly similar but actually varying equipment would no longer have been tolerated. So the output/earnings ceilings functioned to reconcile the circumstances of the work situation and the social code. They enabled the workpeople to acquiesce in the imperfect results of time-study technique and thereby might even be said to have contributed to the continued functioning of the formal organisation of the factory.

But there was also another form of social satisfaction to be gained from 'restriction'. Insofar as it set a limit to individual competition it increased the opportunities for mutual co-operation. A man who was having a trouble-free run on 'good' machines and would comfortably attain ceiling output had time and inclination to spend a few minutes helping a neighbour who had encountered mechanical faults. Men were able to attend to the machines of a colleague who had gone outside for a smoke (officially permitted), and had time enough at the end of the work spell to leave everything straight for their mates on the next shift. Also, the ceiling figure had become something of a target which everyone tried to reach, and a man who had it in sight would willingly go to the aid of another who was not so well placed: an instance of the force of this target aspect (also stressed by Roy, 1952) was the action of a man on 'bad' machines who after some weeks of mechanical trouble suddenly had a better shift and announced to the group his success in achieving ceiling production by hoisting a rag on a stick over his machine! Thus by inhibiting the competitive drive, and facilitating informal co-operation and social interaction on the job, the 'restrictive' group norm increased the satisfaction that the men gained

from companionship at work. As some of them said, they had no wish to return to former days of 'cut-throat' competition when no-one spared a thought for his mates, because nowadays they all 'work together'. This experience of the machine-workers suggests another category of motives for 'restriction', which might be entitled 'desire to continue social satisfactions derived from the practice of restriction'.

Unknown to the investigator at the time of carrying out the field research for this case-study, the same conclusions had been drawn ten years previously by S. M. Robbins (1948) from a three months' participant study of a group of welders in an American plant. Whilst Robbins inferred that "considerations of a potential threat to their security seemed to be the basic factor in preventing them from maximising their earnings" (in other words, uncertainty as to the continuance of the existing effort-bargain), he laid the emphasis in reporting his observations on the amount of (officially forbidden) informal social interaction between the men during each shift. Quoting him again: "The restriction of output may be in part a result of the basic need for social interaction. At the same time, interaction conveniently and happily serves to fill the idle time resulting from the restriction of output". Thus two independent studies, one biased sociologically (Robbins) and the other psychologically (the present case) have both found restriction of output originating with economic factors but being supported by the satisfactions gained from associated social interaction. To personify the contention, Economic Man may begin restriction because he believes it to be in his interest to do so, but Social Man quickly links arms with him.

This hypothesis is not the same as that of the Hawthorne investigators. They interpreted mentions of rate-cutting and unemployment as rationalisations of a more deeply experienced and unverbaised feeling of insecurity in social relationships resulting from the fact that, in the search for efficiency, management could at any time disrupt the network of informal social interaction. They thought of restriction as a defence of the social *status quo*, rather than a source of enhanced social satisfactions in itself.

RENEWED RESTRICTION

To return to the case of the machine-workers. They continued to observe their ceiling of 6,000 components per shift (or 3,600 on some machines) until, eventually, the long-awaited re-timing of the job took place. To the men, this came as the expected justification for the 'restrictive' nature of their output norm. It was the inevitable proof that their assessment of the situation was right.

A sequence of negotiations began which ultimately brought not only a revision of the Time allowed, but also a modification of the payment system as it was applied to them. The total effect of these changes was that on the one hand the men would have to produce more to attain the same ceiling earnings as before, but on the other a high time rate had been incorporated into the method by which they were paid. In short, they had bargained

greater output, from those who were able to achieve it, not for more money but for more security. They accepted this bargain with enthusiasm.

Production rose, and the old limits disappeared. It looked as if individual competition was asserting itself. Then on the research output charts the significant straight line began to re-appear. A ceiling was re-established, not at 6,000 per shift but at 7,000 (and was still in force when the research project ended). The new maximum was as rigid as the former one. No-one went beyond it. Again the intriguing question was Why?

During interviews the remarks of the men about earnings were clear enough. Most of them said that the new 'price' for components did not make it worthwhile turning out any more than 7,000, and that anyway at that figure they were earning what they were used to ('7,000 earns nearly what 6,000 did before'). No interview threw up any hint of continued insecurity about pay, for the revised Time was regarded as settled for good and all. So although the financial incentive to do more seemed to be ineffective, uncertainty over the effort-bargain was no longer a motive for restriction. The immediate insecurity surrounding the worker's economic satisfactions had gone.

Why then continue united group action over output? What motive remained to prompt each individual to conform? The answer was the wish to continue the associated social satisfactions. The men preferred to go on 'working together' ("... a score of 7,500 or 8,000 would show up other men who can't get it") having time to give one another a helping hand and swop banter rather than go flat out with every man for himself. Though one motive for a 'restrictive' norm had gone, the social motive persisted and in the absence of any other strong pressure either way sustained the now habitual behaviour. Also, it may be speculated that a common ceiling-cum-target had become a symbol of group awareness, and that adherence to it assured each individual of the continued approval and companionship of his mates and acknowledged his fellowship with them.

A SYNTHESIS OF RESEARCH RESULTS

The two categories of motivation suggested by this study do not include all the motives brought out by the major researches in this field. The Bank Wiring Observation Room at Hawthorne and Mathewson's work, for example, both spotlighted fear for the future of employment; while, as already mentioned, the Hawthorne writers suggested that restriction was a defence of the network of informal social relationships. Finally, Lupton (1957) has furthered the development of what might be called the 'area of control' theory. This explains restriction as an attempt by workpeople to preserve a minimum degree of control over their own behaviour in the face of the continual extension of managerial control through the techniques of work study, inspection, and the like. Viewed as an explanation of worker motives, it may be suggested that this theory postulates an individual need of a minimum freedom of action, so that the individual will, in concert with

his fellows who have the same need, oppose the usurping of this area of freedom by others.

If a tentative synthesis may be made of the various types of motivation that have been suggested, it is possible to discern five categories, which can be formulated as follows:

Uncertainty as to the continuance of the existing effort-bargain.

Uncertainty as to the continuance of employment.

Uncertainty as to the continuance of existing social relationships (which, on the Mayo hypothesis, could be rationalised and expressed as the first two types of motive).

Desire to continue social satisfactions derived from the practice of restriction.

Desire for a minimum area of control over own behaviour.

It goes without saying that any one motive, or any combination of motives, may be present in any particular case.

As regards the three 'uncertainties' listed first, the hypothesis is that these are engendered by first-hand experience of the work situation, or by beliefs as to the experience of worker groups in the past that are transmitted down the generations (*e.g.*, the apprehension of rate-cutting, a management action that is usually not within the direct experience of those currently in the worker role); and that these 'uncertainties' motivate a restrictive or defensive response. However, it must be admitted that, whilst this hypothesis may be applicable in the conditions of most large-scale industrial organisations, it is not adequate in all circumstances. Lupton (1959) has recorded a case where in a relatively small and insecure firm an extremity of economic uncertainty (the unsure future of employment and income) appeared to have the opposite effect; individuals 'made hay while the sun shone' and went for maximum earnings. But most of these workers were women, a fact which raises the question of sex differences and the influence of roles performed outside the work situation.

Furthermore, there emerges from the above summary a difference between the first three categories and the last two. The former are each predominantly negative in that the goal sought is no more than the avoidance of disaster, the staving-off of some possible threat to the workers concerned, as, for instance, with the machine-workers awaiting the day of reckoning over the Time for their task. But the two last-mentioned categories imply motives which direct purposive behaviour to more positive goals, in the one case the assertion of a degree of personal control over behaviour on the job, and in the other the development and maintenance of more satisfying informal social relationships within the worker group. Both present the probability that 'restriction' of output may not merely be an attempt to ensure that the worker does not lose, but may be a means whereby he gains something in his work situation and enhances the satisfactions offered him by his working life.

This might help to explain the prevalence of group 'restriction' in the United States and United Kingdom. Accounts of worker motivation have

long focussed on fear of rate-cutting or unemployment and the like, and may not have given sufficient weight to the possibility of 'restrictive' group action holding positive advantages for those involved, particularly in the form of social satisfactions of the kind described in this paper.

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Product Testing and Consumer Food Preferences *

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MY purpose in this paper will be first to sketch in briefly the general background of consumer product testing, then to point out some contrasts with laboratory-type taste tests, and finally to indicate by examples the opportunities that exist in this applied field for carrying out side-research of a fundamental kind on both the methodology and the theory of the judgment process.

Since so many papers in this symposium have been concerned with natural food products such as fish and milk, I think I should say that the background of investigation from which I am speaking is that of the manufactured or processed food product.

The list of such products which an independent market research firm will investigate in the course of a year or two is very extensive. It may include, for example, soft drinks, food beverages, sausages, cake mixes, some of the wide variety of lines in the confectionery or sweet industry, ready-to-eat breakfast cereals and tinned goods. With this type of branded and packaged food, consumer preference testing on a large scale becomes a commercial necessity. A food manufacturer must continually introduce new products or else improve existing ones, if he is to maintain his share of the market in the competition with other firms. The cost of mounting a full scale consumer test is high compared with laboratory taste panel work, but is low when compared with the losses that can come in trying to market an unsuccessful product.

By the time an innovation arrives at the stage of large scale consumer testing, it will usually have gone through a technical process of development within the firm. The range of possibilities will have been narrowed down to one, two, or perhaps five prototypes, less promising modifications having been eliminated using a taste-test panel, or a small and not very representative consumer panel composed of the firm's employees.

My impression is that whatever may be the case in America, or in future in Britain, at present very few British food firms carry out any systematic taste testing at the intermediate stage, though nearly all resort to full-blown consumer tests at the final stage.

These consumer tests involve placing the product for testing in a large representative sample of households. The type of test I shall be referring to here is known as a 'blind' product test, since the product is placed for

* When Dr McKennell read this paper at the Annual Conference of the British Psychological Society, Hull, 1960, in the symposium on Food Assessment and Food Acceptance, he was with Attwood Statistics Limited.

testing in a plain, neutral packet identified only by a number or code. This procedure has the effect of eliminating from the test the numerous marketing factors such as the name, the label, the price, packet, distribution and the advertising. These factors I deem to be outside the terms of reference of the present paper, which is concerned with tests of the inherent properties of the product. It should be said, however, that in practice the psychologist engaged in Market Research spends a good deal of time investigating how far consumer preferences are determined by non-substantial 'image' factors conveyed by the package and the advertising. I might mention here, in passing, that one procedure for doing this actually involves an extension of the ordinary product-testing technique, by bringing modifications of the package and the advertising line into the design of the product test.

However, in the straightforward product testing with the food in a plain package, marketing factors do not enter into the judgment of preference. There is a point of resemblance here between consumer preference tests and laboratory taste panel work in so far as the judgments in both are based on the inherent properties of the product. However, the differences between the two procedures are very wide indeed. Consumer product testing aims to obtain judgments which are natural and naive rather than expert; judgments, that is, which resemble as closely as possible those which the consumer would make outside the test situation. This is the ideal. In practice the testee will always have special attitudes which derive from the test situation. I shall mention shortly the way these attitudes can swing a preference judgment.

A naive, natural judgment is also an unfettered judgment. This means that limits have to be set to the amount of control which can be placed on the manner in which the test food is eaten or prepared for eating. With foods that require some preparation, sausages or cake mixes, for instance, one can issue instructions for preparation but beyond a certain point one cannot be sure that they will be followed. Even with a ready-to-eat food such as breakfast cereals one cannot control such factors as the quantities which are eaten at a time, the amount of milk or sugar added or the length of time the cereal is allowed to soak before eating—all of which factors may influence the flavour variable.

However, although there is little possibility of laboratory-type controls over the individual judgment, product testing does allow considerable statistical control on a large scale over the aggregate of judgments. One can ensure, for example, to take the simplest case, that any differences in treatment which could influence preferences are adequately randomised between a standard product and the test product.

The number of individuals who take part in a product test is always large enough to permit adequate randomisation of this kind. By comparison with laboratory taste panels this number is in fact extremely large. At Attwoods, a product test based on less than five hundred individuals is unusual, and studies which involve placements in, say, 1,200 households, yielding judgments from some 3,000 individuals, are not uncommon.

I will illustrate by means of an example the kind of refined experimental design which this large sample size makes possible. A survey was designed to evaluate the public's reaction to a new sweet assortment and to list in order of preference the 18 varieties of which this assortment consisted. The ranking of components within the assortment was carried out by pair comparisons. Eighteen sweets give 153 possible pair comparisons, so it was not practicable to have each individual judge each possible pair of sweets. Instead it was arranged that each individual judged the entire assortment of 18 varieties by comparing only nine pairs. It thus took 17 individuals to judge every possible pair, 9×17 giving 153. Seventeen individuals thus gave one replicate and the whole test was then replicated 30 times, utilising 30×17 or 510 individuals in the complete study. This design fulfilled the requirement that each variety of sweet was compared with every other variety an equal number of times, and the entire panel of individuals contributed to the score on each sweet. The paired comparisons matrix was filled in in such a way that the same individuals fell in a given sweet column so that comparisons between sweets were independent of differences between individuals.

The packing arrangements for this job were as formidable as the design. The 18 lots of varieties had to be made up into 153 lots of pairs and these pairs then combined into lots of 17 different sets of nine pairs, each set of nine pairs being the total placement for one individual, all this being replicated 30 times. The nine pairs were tested over a period of about a fortnight, three pairs of sweets being left on each of three visits, with a fourth call-back visit. Sequential effects were also balanced out within the test design.

All the packaging, however, was carried out in advance at the client's factory. Once the packaging was done according to this master plan, placement with the consumer panel was straightforward and it could be left to each consumer to make the comparison of pairs allotted to him in his own way. His task was made simple in the extreme.

This study, then, typifies some of the characteristics of product testing and some contrasts with laboratory taste-testing. We have, instead of laboratory-type controls, a judgment which is as simple and unfettered as possible. Instead of a handful of experts we have a large, representative sample of ordinary consumers. This large sample then makes possible refined statistical controls, so that the experimental rigour denied to the individual judgment is brought back into the test design by this other door.

At the same time, the possibility of this kind of statistical control does not absolve the market researcher from concern with the judgment process itself. Most market research agencies rely here on a back-log of experience built on a succession of *ad hoc* procedures. But the entire area of how best to elicit reliable yet natural judgments of preference from representative consumers is in need of critical study. I propose in the remainder of this paper to review a limited range of problems of this kind, concerned with the use of the hedonic scale, and some investigations which have been

carried out on this at Attwoods. In the time available I will have to give a somewhat bald account of these studies, and in particular I will not be able to elaborate on their implications or limitations.

The hedonic scale is a term originated by Beebe-Center for a scale of seven categories ranging from 'very unpleasant' through 'indifference' to 'very pleasant', against which the hedonic tone or degree of pleasantness of a stimulus can be evaluated. In product testing a scale of five categories is usually sufficient, ranging from, say, 'like very much' through 'indifference' (neither like nor dislike) to 'dislike very much'. The consumer checks one of these categories according to his judgment after testing the food product.

The use of the technical term 'hedonic scale' for this simple device is perhaps only justified if it serves to remind us of the considerable background of research into the function of this kind of scale. I refer here not only to the work of Beebe-Center (1) on the hedonic scale, but the research on scales of judgment generally by the psychophysical method of Single Stimuli beginning with the early work of Volkmann (2) and continuing with the more mathematically developed work on adaptation level theory by Helson (3) and Johnson (4). This academic work is limited in practice because the effects isolated and the type of subjective scale studied are functions of purely laboratory stimulation, and it can be argued (as I have shown elsewhere (5)) that the results are carried in the experimental design. However, these studies do serve to alert us to the type of interserial and contrast effects, the bias and the constant errors, which are liable to occur in the use of subjective scales of judgment.

For example, in the use of the hedonic scale, when we ask the housewife to rate how much she likes a food product we should be wary of assuming that the rating given measures some absolute degree of preference. The results of an investigation illustrate this point. Some 400 individuals were asked to rate their degree of liking of a food product which we can call 'brand X'. These were the percent ratings when brand X was presented for tasting alone. (See table.) These are the ratings obtained when brand X was tested by different individuals along with two other brands which were preferred to brand X. The other brands received higher preference ratings than brand X.

	RATINGS OF BRAND X	
	JUDGED BY ITSELF	JUDGED ALONG WITH OTHER BRANDS
NUMBER OF INDIVIDUALS JUDGING	400	1,500
Rating categories:	%	%
Like very much	64	33
Like moderately	17	27
Neither like nor dislike	14	15
Dislike moderately	4	14
Dislike very much	1	11

This depression of ratings for brand X when judged against other preferred brands might be regarded on Beebe-Center's theory as an example of 'hedonic contrast'. However, hedonic contrast does not seem to explain the original high ratings obtained. There are reasons for thinking that these original high scores represent a kind of 'gratitude factor' in product testing, a tendency for housewives to be unwilling to look a gift horse in the mouth. This is the influence of the test situation on the preference judgment, to which I referred earlier. I have found further qualitative evidence of this 'gratitude factor' in group interviews conducted with housewives following a product test in which they have taken part.

The confectionery study involving pair comparisons of 18 sweets which I detailed earlier has given us an excellent opportunity to investigate the effects of hedonic contrast in detail, and we are following this up. As part of this study, after each consumer had made a paired comparison they were asked to rate each sweet in the pair for degree of liking on a five point scale. We have therefore 153 pair comparisons followed by hedonic scale ratings of each pair member and the whole replicated some 30 times. This gives an abundance of data which can be examined for hedonic contrast effects. If the effect does not take place we should expect pairs of sweets to fall into the same rating category as the inter-pair difference becomes smaller. Hedonic contrast would reverse this tendency so that the sweets in a pair will tend to fall into adjacent categories. The actual analysis now proceeding involves examining the inter-pair differences obtained from pair comparisons and their regression on differences obtained by rating on the hedonic scale.

We also took the opportunity in this same study to examine the relative precision of discrimination by paired comparisons and ratings. This is the equivalent of an experiment carried out in 1928 by Wever and Zener (6), who compared the results of paired comparisons and ratings of the heaviness of weights, as obtained by the psychophysical methods of Constant Stimuli and Single Stimuli. Our data, though analysed for precision on a different basis from those of Wever and Zener, agree with theirs in that we also found the same degree of precision was afforded by the two methods.

In this same product test, too, an amount of product was held in reserve which, in the event, we were not called upon to use in the survey. This surplus was then utilised in an independent test of the optimum number of categories to use in the hedonic scale. We took identical sets of six sweets and had them rated for degree of liking on a five, a seven and a nine point scale using different randomly drawn groups of individual with each scale. The entire experiment was replicated three times. We found no evidence of increased discrimination between sweets as the number of scale categories increased. We found no evidence either of an increased difference between individuals as the number of scale points increased.

While every caution is necessary in generalising the results beyond the specific circumstances in which they were obtained, the above studies are examples of pure research on judgment problems pursued in an applied field.

There are many problems in the psychology of judgment which can be resolved only by the accumulation of large numbers of judgments. In food tasting, the classical psychophysical procedure of obtaining large numbers of judgments from the same individual is impracticable. The alternative procedure of obtaining a few judgments from a large number of individuals is too costly in a study mounted solely for pure research purposes. Yet in conventional product testing, sufficient quantity of data is obtained as a matter of routine, and the cost of the additional analysis of the judgment process is negligible. The psychologist working in this applied field is therefore in a good position to make original contributions both to the methodology of investigating and the basic understanding of the judgment process.

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Some Psychological Aspects of Taste Testing*

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THIS paper is an attempt to collect under one heading some of those features of the sensory evaluation of food quality that may be of interest to the psychologist, but it is written from the point of view of a food technologist, and therefore takes the form of a series of implied questions.

FOOD ASSESSMENT

Similarities between the type of test in which eating qualities of food are assessed, and psycho-physical experiments which are designed to study threshold values and discrimination, are well known. Indeed the findings of the latter are often of great value to those concerned with the former. There are, however, major differences between the two lines of investigation which are not always appreciated. The most important of these is a basic difference of approach. The food technologist is interested in the food; he uses people to examine it only because he cannot use an instrument. There is no way of measuring flavour in the laboratory, and methods of measuring colour and texture are often difficult, expensive, or without useful meaning. What the food scientist would like therefore would be to be able to use a human palate as a measuring device. He realizes that palates differ, and therefore uses a group of them, attempting to limit their responses to what is relevant, and hoping that the consensus of opinion or average result will permit him to draw conclusions about the food under test. In other words, the test is a bio-assay (Harries, 1955) in which the responses of a collection of organisms are studied in order to discover facts about the stimuli. That the test organism is articulate is not always to the experimenter's advantage.

In contrast, the psychologist is interested in the organism. He uses known stimuli, and from the responses hopes to discover facts about the sensations aroused, and about the processes involved. The psychologist therefore needs no knowledge of food, even when he is studying the senses of taste and smell, because he can use chemical solutions.

Nevertheless, some phenomena are common to both types of enquiry. For example, psychologists are well aware of the biases that exist in situations where subjects are given a choice. One test, which we frequently use when we wish to know merely whether there is a difference of any kind

* A paper read at the Annual Conference of the British Psychological Society, Hull, 1960, in the symposium on Food Assessment and Food Acceptance.

between two types of food, involves the presentation, to a panel, of five samples coded at random consisting of three of the first type and two of the second (Harries, 1956). The tasters are informed of this, and are asked to allocate the five samples to two groups, a pair and a triad, on the basis of any sensory characteristic. (This is a straightforward extension of the better-known triangular test.) An individual taster's chance of success in the absence of a real ability to discriminate is one-tenth, and the proportions of correct responses required to demonstrate significant differences are readily calculable. These tests of significance assume that, in the absence of a real difference, allocations will be random. In fact, if the samples are

TABLE 1: FREQUENCY OF INCORRECT IDENTIFICATION OF THE PAIR
IN 'TWO-OUT-OF-FIVE' TESTS

PAIRINGS	STRAIGHT LINE PRESENTATION	CIRCULAR PRESENTATION
1 and 2 ..	5	20
1 and 3 ..	6	22
1 and 4 ..	2	16
1 and 5 ..	20	24
2 and 3 ..	7	24
2 and 4 ..	11	21
2 and 5 ..	11	16
3 and 4 ..	9	19
3 and 5 ..	4	15
4 and 5 ..	7	16
TOTAL ..	82	193

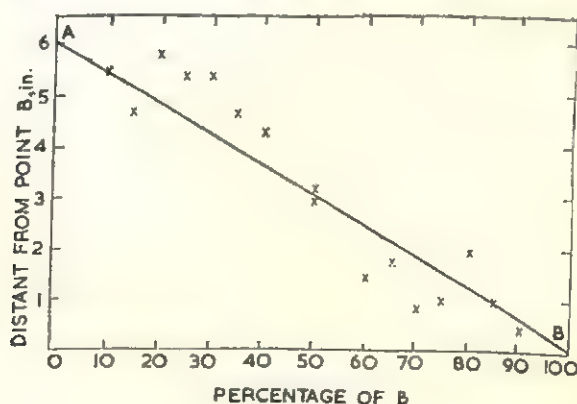
presented in a line allocations are far from random, as will be seen from the second column of Table 1 which shows the frequency with which each possible pair was chosen, in a series of tests with soup, when there were no real differences between the two types. In another series of tests, circular presentation was used, and the code numbers of the samples were written on the undersides of the containers. The frequency with which all possible pairs were chosen is shown in the final column of Table 1. The distribution of the second column of the table differs significantly from chance expectation, the end samples of the line being chosen particularly often, and when the two end samples are of one type of food, the three middle samples of the other, there is a greater basic chance of successful differentiation with straight line presentation. The distribution of the third column of Table 1 does not differ significantly from chance expectation; whether this is as a result of circular presentation, or because the tasters could not see the code numbers, we do not know, on this evidence. The point I wish to make is that we do not care. Having obviated the difficulty, we are not particularly interested in the phenomenon itself. To the food technologist, then, psychology is something of a necessary nuisance; but a knowledge of past studies on the differences between physical chance and chance involving a psychological element is of considerable help in such situations.

Other psychological hazards in food assessment tests include the temptation for the investigator to 'lead' the panel, and the danger of one taster setting himself up as an expert (possibly on grounds of rank or position), especially during discussion sessions. The extravert is a psychological hazard in these tests since their purpose can be defeated if, for any reason, all tasters do not carry equal weight.

Such traps as these are obvious and easily avoided. More difficult to overcome is a reluctance on the part of the tasters to use the extremes of a scoring system, because they feel that they should keep the extreme values of the scale for future use. They also dislike not being able to express any differences they may find between samples in respect of irrelevant characteristics. For example, a series of tests might be confined to flavour, but if there are colour differences then tasters will find differences in flavour when no provision is made in the scoring system for colour assessment. Trained tasters may be able to ignore the irrelevant differences, but they are frequently unhappy in doing so. Coloured lighting can be used to mask colour differences but there are no ways of masking textural differences. Generally, insufficient is known about the mutual effects of the different eating characteristics on each other. Since Moir (1936) gave an illustration of the influence of colour on flavour judgements little seems to have been done to study interactions between different eating properties, when assessed together. Certainly most psycho-physical experiments are confined to a single sensation field, whereas it is much more usual in food assessment to ask for judgements concerning flavour, appearance, texture, colour, etc., to be made concurrently. Further, each sensory characteristic may be subdivided into several components, the taster being required to give a sensory analysis of each sample.

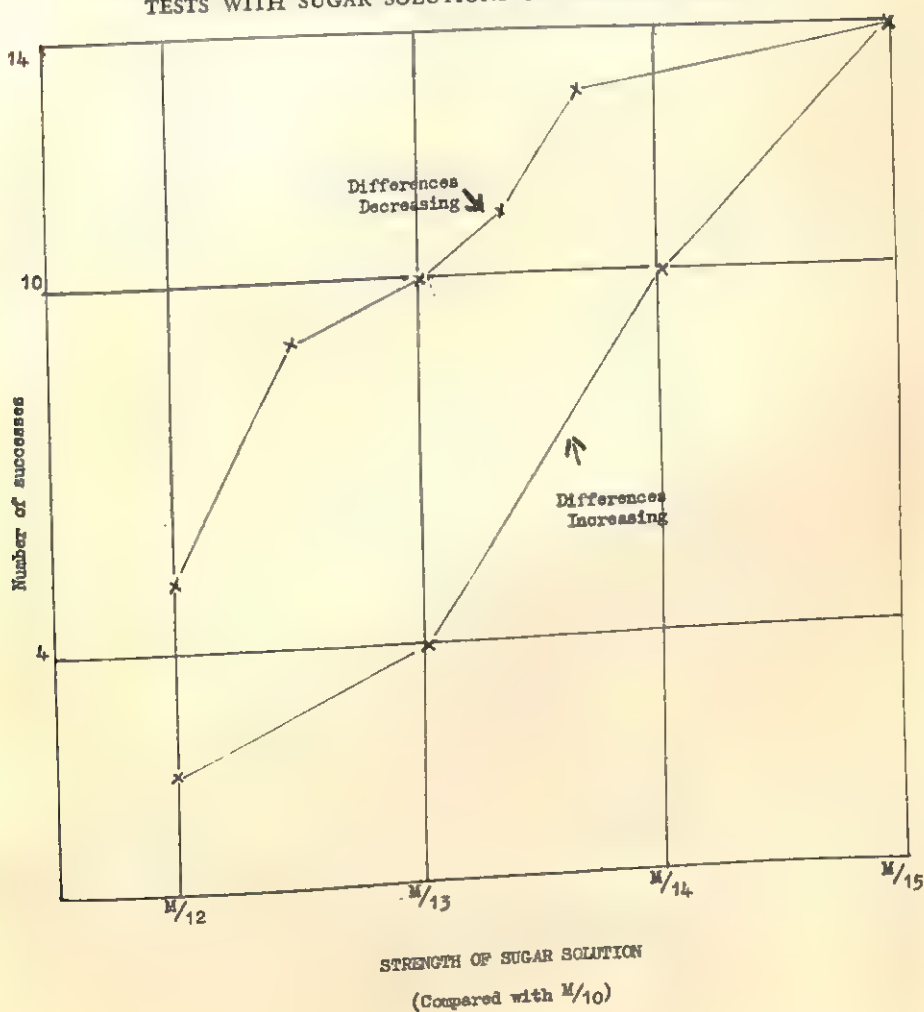
The arbitrary scoring scales which the food technologist needs to construct, in order to carry out any extensive investigation using taste panel techniques, owe much to the earlier work done by psychologists on sensation-stimulus relationships. It is at least popularly supposed that these relationships are generally logarithmic. Thus when Wood (1949) asked, "If two samples having scores of 2 and 8 were mixed in equal proportion, how

FIG. 1: AVERAGE SCORES GIVEN TO MIXTURES OF TWO SAMPLES



would the mixture be scored—as 5, the arithmetic mean, or as 4, the geometric mean?”, the immediate reaction would be to answer “As 4, the geometric mean”. Yet when an experiment was made to examine this point (Harries, 1960), the answer appeared to be the opposite. A panel of judges was given plain pieces of paper marked with a straight line, six inches long, labelled A at one end and B at the other. Four samples of coffee were presented, at each of several sessions, labelled X, Y, A and B. The judges were asked to assume that samples A and B corresponded to the ends of the line and to indicate with crosses the relative positions of X and Y, which were, in fact, mixtures of A and B. Throughout the series of tests the proportion of each ingredient in samples X and Y was varied from 10%, in steps of 5%, to 90%. Figure 1 shows the distances of the crosses from one end of the line, measured subsequently, plotted against the proportion of

FIG. 2: NUMBERS OF CORRECT RESULTS IN DIRECT-DIFFERENCE TESTS WITH SUGAR SOLUTIONS OF VARIOUS STRENGTHS



one ingredient. Each point on the graph is the average of 6-8 readings. When the test samples X and Y consisted of equal proportions of A and B, the crosses were placed almost exactly in the centre of the line, on average, and elsewhere, the points were not far removed from a straight line. In other words, differentiation proceeded in roughly equal steps, which does not seem to be in accordance with existing theory. This may have been because the conditions of the test were unusual in that judges were not asked to give the samples an arbitrary score. Further, the scale was anchored at both ends with labelled samples, the sensory difference between them being indicated by a fixed predetermined magnitude. In other words, it may be that sensory differentiation is logarithmic only when 'seen from one end', like telegraph poles along a straight road.

Systems of scoring are probably the feature of sensory tests which requires most attention, and ideas for standardisation seem to be scarce. One such idea uses the psychological concept of the just noticeable difference. For example, in the 'two-out-of-five' difference test, if 10 people are used, four correct results indicate significance at the level p less than .05; five correct, p less than .01; six correct, p less than .001. One might enquire therefore how far a scale of magnitude of the sensory difference between two samples could be constructed from the proportion of correct results over and above the number required for significance (Harries, 1953). An attempt to examine this question is illustrated in Figure 2. Sugar solutions of molar strength M/10 were compared with solutions varying from M/12 to M/15, the difference being increased until all the people taking part could differentiate successfully then decreased. The graph

TABLE 2: FACTORS AFFECTING ATTITUDES TOWARDS FOOD

THE ENVIRONMENT	THE INDIVIDUAL	THE FOOD
Geography Season Economics Social Status Religion Traditions Social custom Nutrition education Advertising	Age Sex Health Activity Psychological need Allergies Associations Recent food history Knowledge of Food Discrimination	Value Cleanliness Appearance Colour Odour Flavour Texture "Body" Dependability Packaging Convenience

shows that the results lay along two distinct curves, the lower line representing an increasing magnitude of difference between the test samples, the upper line a decreasing difference. In this particular experiment, practice effects may have accounted for the two curves, but there are indications that such 'hysteresis effects' occur in psycho-physical experiments. Such a scale is limited in extent, but it is relevant at the important part of the sensory continuum. It reflects just noticeable differences and depends upon the

fact that these vary from person to person. That such a scale does not seem to have been used in practice probably illustrates the basic difference in approach between experiments in psychology and in food technology. The psychologist is content to study just noticeable differences for an individual person. The food technologist asks, "Just noticeable to whom?" He must know before he can use such a scale how far people differ in their sensitivities, what is the distribution of sensitivity among his panel, and whether this distribution itself depends upon the food or upon the level of sensation. This is because he must use a group of people and does not wish to study them as individuals.

The above examples will serve to illustrate some of the problems facing the food technologist concerned with food assessment, and may indicate why the results of psycho-physical experiments are not always of much help to him. The greatest barrier to mutual assistance, of course, is the usual one of increasing specialisation. The food technologist knows as little of the psychological literature as the psychologist does of published material on food technology.

FOOD ACCEPTANCE

The attitude of the food assessor to his test is as objective and scientific as possible. In the interests of accuracy, consistency, and maximum discrimination we deliberately exclude those factors which operate during normal food consumption, but which are extraneous to the purpose of any particular investigation. The food taster is operating under artificial conditions. Before the results of these tests can be efficiently applied, they have to be translated into terms of everyday life, and this is probably the most difficult task in our present state of knowledge.

Any study of attitudes towards food, of choice of food, or of food habits, must take account of several groups of factors. Some years ago I suggested that these might be sub-divided under three headings, as shown in Table 2. This is not a good classification, since the groups are not mutually exclusive; indeed the same factor may operate in more than one group under different circumstances, and certainly the factors listed are interactive. But this classification serves to illustrate relationships between food assessment and food acceptance. Analytical taste testing is concerned only with the last of the three groups. In order to achieve any degree of objective accuracy, the effects of factors in the first two groups must be rigidly controlled or eliminated. The ideal would be laboratory, instrumental, methods of assessment of food quality. But even in such a case the answers would still need to be interpreted in terms of food acceptance and it is clear that psychological factors play an important part in this field. A telling example of the danger of ignoring food acceptance issues is quoted by Lepkovsky (1959). American servicemen during the war, describing the now famous K-ration, said, "We could undoubtedly survive on it a lot longer than we'd care to live". The difficulty of the transition from food assessment to food acceptance is reflected in the fact that acceptance or rejection of a dish may well depend

upon whether one is offered it at a works canteen, at home, or when invited to dinner at the boss's house. Nor is the relationship one sided. The social importance of food habits cannot be over-emphasized. Whilst it may be realized that prison riots can be sparked off by a particularly bad meal, or that marriages may be wrecked by an inability to cook, little scientific work has been done to determine how great a part food plays in such cases, compared with other factors. Isolated cases are quite well known, such as the one quoted by Selling (1942) of the "man who was not re-elected to a county judgeship because he invariably fell asleep on the bench. We corrected the situation by advising him to have his large meal in the evening and to restrict his diet to the minimum at noon. He did this and when the next election was held he was sufficiently alert to get back on the bench and to stay there." Such books as Renner's *The Origin of Food Habits* are full of interesting incidents reflecting the importance of food. Nutritionists have devoted a great deal of effort to surveys of food consumption, and there are some interpretations of the results in terms of changing food habits. Hollingsworth (1961) discusses the results of the National Food Survey and other data from this point of view, and suggests reasons for some of the changes that have occurred in Britain since the 1939-45 war. Such studies are necessarily concerned with national averages. Psychological studies of attitudes towards food are concerned with individuals, and as far as I am aware, there has been no attempt at a systematic scientific study of the psychology of eating. As a field of enquiry, it seems to be at the anecdotal stage.

The importance of co-operation between the nutritionist and the psychologist can be illustrated by the problem of obesity. A fascinating paper by Ayers (1958) traces the changing attitude towards obesity from Greek and Roman times. Although there were occasional warnings against over-eating, it is clear that until fairly recently little opprobrium was attached to the state of being fat. The nutritionist has always argued, rightly, that obesity is caused by over-eating and that slimming can only be brought about by some degree of starvation, but a solution to the problem can only be found, in many cases, by asking a further question concerning the causes of over-eating. The psychologists, according to Ayers, took a firm hold of this question and the pendulum swung too far; obesity became "a mental state, a disease brought on by boredom and disappointment; greed, like the love of comfort, is a kind of fear." But the problem eventually brought the nutritionist and the psychologist together. It must be remembered that though calories cause fat, we do not eat calories. Yudkin (1959) has suggested that there may be control mechanisms, similar to the control mechanism of hunger, for the essential vitamins; but we do not eat vitamins either. We eat beef and Yorkshire pudding, cod and kippers, and a consumer's choice between sausages and sirloin may well be purely psychological. Before those concerned with experimental studies of food quality can hope properly to apply their findings, much work remains to be done, not least by the psychologist. What is required is an extension of the intensive study

of a few subjects to a larger, more observational study of the operational world of eating. We need a Freud of food. "In compelling man to eat that he may live," says Brillat-Savarin, "nature gives him an appetite to invite him, and pleasure to reward him." Clearly therefore the psychologist has an important part to play in the study of food habits and food acceptance. Some work has already been done, notably in America, but to judge by the papers I have seen, those who have done this work would be the first to agree that in this respect the surface of knowledge has barely been scratched.

I wish to thank those colleagues who have helped in the work on which this paper is based, and in particular the members of taste panels, whose cheerful co-operation is vital. Thanks are also due to the Society of Chemical Industry for permission to reprint figures 1 and 2.

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The Fish Technologist's Attitude to Food Assessment*

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1: INTRODUCTION

IN spite of much research into new methods of food production and preservation, most present-day foods are basically much the same as in the Bronze Age, although the proportions of various types of foodstuff in the dietary has changed. But modern society has problems of storage and distribution which industry strives to solve, sometimes with the help of food technologists. The basic problem for modern food production is how to adapt cottage processes to the conditions of mass production and distribution, whilst at the same time preserving as much as possible of the gustatory excellence of domestic production. Each foodstuff no doubt poses its own problems of adaption.

One of the principal objects of Government fish technologists is to obtain the scientific information that will enable the fish industry to improve its processes so that the 'quality' of its consumer goods can be raised. The first problem is therefore to measure 'quality' as accurately and consistently as possible, so that the degree of reproducibility of quality in a given product may be measured and also the degree of improvement afforded by a new process over an existing one. Although there exist some useful chemical and bacteriological aids for assessing the quality of fish, it usually has also to be assessed sensorily. It is convenient, if not obligatory, to do this on some numerical scale of quantitative or pseudo-quantitative scores which can be treated arithmetically.

Although all the senses, except hearing, may be used in arriving at an assessment, food is for eating, not for looking at, or simply for buying and selling. The fish industry in the past has paid more attention to visual appearance, including packaging, than to the eating quality of its products. All along the distribution chain from the port fish market to sale in the shop, the superficial appearance is practically the only criterion of quality used commercially. Fish is rarely tested by cooking and eating. Industry is only gradually becoming aware that outward appearance can be an unreliable guide to flavour, important though it may be in determining immediate sales. As a result of this limitation, what can only be regarded as very inferior products can be purchased which may well affect sales over a long period; generally speaking the technical reasons for these inferior products are known.

* A paper read at the Annual Conference of the British Psychological Society, Hull, 1960, in the symposium on Food Assessment and Food Acceptance.

Although the traditional processes of handling fish admit of only rudimentary control over physical variables, newer knowledge and methods both allow and require improved measures of 'quality control'. Government fish technologists are therefore faced with the problem of adapting their systems of quality assessment to advise and assist industry in instituting better control over their processes and products. It is argued that the industry would benefit if in this way the sale of inferior products was prevented and that in the long run total sales might thereby be increased.

Any standards of quality that are suggested must inevitably represent a compromise somewhere between ideal and current practice, having regard to physical possibilities and putative consumer susceptibilities. Although a few firms possess some information about consumer likes and dislikes, little or nothing has been published that can assist in the formulation of standards. In default of such data, more or less common-sense standards of quality have to be proposed, that would be likely to encourage industry to adopt procedures that would eliminate the worst material now placed on sale without making it impracticable at any given moment for the large majority of firms to reach the required standard.

This operation is still to a large extent subjective and depends on the knowledge and judgement, commercial as well as scientific, of the technologists working in the field in the belief that it is desirable to try to do something about raising the level of quality of the fish reaching the public. The authors do not accept the general validity of the proposition sometimes put forward that many people would prefer stale fish to fresh.

The authors are also acutely aware of the fact that all practical advice to industry depends on methods of quality assessment which involve psychological factors at every turn. They would plead for wider recognition of the desirability of integrating realistic psychological discipline into food technological research.

The Humber Laboratory of the D.S.I.R. has recently had experience of the use of sensory scoring procedures for assessing the 'quality' of kippers (which are smoked, split and slightly salted herring) and cod fillets, under experimental and commercial conditions.

II: EXPERIENCE IN TASTING KIPPERS

In the case of kippers, D.S.I.R. responded to a request from the industry in Hull to grade their current production. It was inexpedient and impracticable to wait for the psychological and statistical advice necessary for establishing a sound scoring system, before giving industry some practical advice. After preliminary experiments and discussions a system was devised whereby a crude mark out of 10 was allotted by a small panel (of 4 to 6) for both overall condition, *i.e.* of appearance, smell, etc., in the raw state, and eating quality after cooking. A kipper ideal in various defined attributes was awarded full marks, one regarded as just passable 7 out of 10, while 4 out of 10 was so unpalatable as to be regarded by the panel as virtually uneatable. This 'off-the-cuff' subjective marking was supplemented by a

'dichotomising key' which was useful in pin-pointing defects (1). The mean score for the panel on each basis usually agreed to within half a mark. It was gratifying to discover subsequently that 4 out of 10 and below agreed with a Public Health Inspector's level for condemnation as unfit for human consumption. It may be that the 'passable' grading is equally realistic.

TABLE 1: OVERALL QUALITY OF KIPPERS PRODUCED IN HULL, 1956-1957

QUALITY GRADING	SCORE (RAW AND COOKED)	PERCENTAGE OF SAMPLES
Good ..	>7.5	25
Passable ..	7.5-6.1	47
Poor ..	6.0-4.0	23
Bad ..	<4.0	5

The results of the first 500 samples tested are given in Table 1. When these pseudo-quantitative subjective data were treated statistically and arranged in the form of a 'league table' it was seen that some firms consistently produced 'better' (*i.e.*, higher scoring) products than others, for reasons which were, by-and-large, determinable.

TABLE 2: GRADING OF KIPPERS PURCHASED IN RETAIL SHOPS, 1959

	TOTAL NO. OF SAMPLES	PERCENTAGE SCORING		
		OVER 6.0 (GOOD TO PASSABLE)	BETWEEN 6.0 AND 4.0 (MEDIocre TO POOR)	BELOW 4.0 (VERY UNPLEASANT TO INEDIBLE)
Fresh ..	93	42	47	11
Frozen ..	73	47	34	19

The quality of the product on sale in the shops has also been investigated, mostly in the Hull area, with the preliminary results given in Table 2, from which it seems that it is possible any day to buy kippers that would probably not pass the Public Health Inspector. On the basis of this work D.S.I.R. has trained for the Herring Industry Board a number of men whose duties will be to advise kippering firms on ways in which the standard of their products could be raised. It is considered that this effort has resulted in some improvements, however slight, in the quality of the kippers reaching the consumer.

The same scoring system was also useful in experimental investigations such as the effect of degree of drying and smoking on bacterial spoilage and the time the kipper could be kept in palatable condition (see Table 3).

TABLE 3: EFFECT OF INTENSITY OF SMOKING ON THE KEEPING QUALITY OF KIPPERS

SMOKING TIME IN HOURS	INITIAL TASTE PANEL SCORE		TIME TO FALL TO COOKED SCORE OF 7 (LOWER LIMIT OF ACCEPTABILITY) (DAYS)	TIME TO FALL TO COOKED SCORE OF 6 (REJECTION LEVEL) (DAYS)
	RAW	COOKED		
1	6.5	8.0	1½	3½
2	7.7	8.7	5	7
3	9.3	9.2	7	9½

At the same time as this work on kippers was proceeding at the Humber Laboratory, D.S.I.R. succeeded in interesting the Department of Psychology of the University of Hull in the problem of the organoleptic assessment of quality in kippers. A system of sensory assessment for ordinary 'fresh' cod and haddock had been developed (2), but it was realised that the sensory assessment of smoked fish might possibly be basically more complex on account of the added variabilities of smoke and salt superimposed on that of the fish itself. A later paper by Dr J. O. Robinson gives details of the results of this work. So far as D.S.I.R. was concerned, these showed that there could be no short cut to a taste panel grading scheme of improved reliability for kippers.

III: EXPERIENCE IN TASTING COD FILLETS

Although there was available, as a result of the efforts of Shewan and his co-workers (2), a sensory scheme for assessing the quality of fresh cod and haddock, which are much more important commercially than kippers, until recently there had been little opportunity to apply this scheme under actual industrial conditions. 20,000 cwts. of fish, mostly cod, are landed and sold at Hull daily to some hundreds of merchants in the course of an hour or so, after only superficial examination. Public Health Inspectors condemn on an average about 1% of landings. Another 5% is left unsold, because of lack of demand and indifferent quality, and this fish is used largely for canning as cat and dog food—a less remunerative outlet than sale for human food. The trawler owners and merchants have for the past two years operated an agreed system whereby three merchants examine the fish on display every day and recommend how much should be withdrawn from sale from each landing. The trawler owners have now requested D.S.I.R. to examine the efficiency of this performance. For this purpose a taste panel has been trained to assess cod, using the Shewan and Ehrenberg numerical scoring system in which a mark of 4½ out of 10 for cooked flavour roughly corresponds with the Public Health Inspectors' normal condemnation level, and will examine samples of fish, withdrawn and left for sale, each day for a year. Although at the same time the trimethylamine chemical test, already known to be useful, will be applied, there is at present no satisfactory alternative to 'subjective' examination. In

Canada, where the Government grading of all fish is soon likely to be compulsory, this chemical test is used only to check on the consistency of the graders' subjective judgement.

The panel already trained in Hull to study principally the effects of holding temperature on the rate of spoilage of cod has been investigating the quality of fish on sale in various towns in England in the past year, with the preliminary results given in Table 4.

TABLE 4: GRADING OF COD FILLETS PURCHASED IN RETAIL SHOPS, APRIL-JUNE, 1960

	NO. OF SAMPLES	NO. OF SHOPS	NO. OF BRANDS	NO. OF TOWNS	COOKED FLAVOUR SCORE (% OF SAMPLES WITHIN THE LIMITS)					
					8-8.9	7-7.9	6-6.9	5-5.9	4-4.9	3-3.9
Fresh	897	146	—	12	0	7	40	27	11	15
Frozen	272	140	10	10	1	11	29	43	16	0

As in the case of kippers, it is possible to buy in the shops fish that would probably be condemned as unfit at the port or inland wholesale market. Freezing, which it has been expected would be used by industry to improve quality as well as to store surpluses, has once again produced disappointing results. Some firms' products are distinctly better than others', and the basic technological and economic reasons for this are known.

IV: SOME CONCLUSIONS

1. A proportion of the fish on sale in the shops seems to be below the normal condemnation level. Presumably still further deterioration occurs between purchase and consumption. But we have no certain knowledge of consumers' attitudes to fish palatability.
2. The industry itself obviously regards it as a better boost to sales and therefore profitability to use eye-appealing packages, and advertising, than to improve eating quality by better control over spoilage during transport and distribution. As a result, the popularity of fish is in danger of waning in competition with other foodstuffs, although there are various factors opposing this trend, including D.S.I.R.
3. It is difficult to envisage effective control over the conditions of handling fish at the 50,000 or so sales points represented by fish shops, ice cream shops, etc., although it may eventually be necessary for this problem to be tackled.
4. Psychologists can contribute to food assessment by helping technologists to ask the questions that can properly be answered by taste panel experiment. To do this the psychologist must learn something of the food technologist's methods and problems, so that tasting is regarded not as an end in itself but as a means to some technological end. Just as we have had first chemical engineers and later biological engineers, so now perhaps we need 'psychological engineers' in food science.

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Some Recent Investigations Concerning the Assessment of Quality in Kippers*

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TWO years ago an attempt was made to devise a taste panel technique for the assessment of kippers that could be developed into a more sensitive instrument than the rating technique devised by Dr Burgess of the Humber Laboratory. Dr Shewan and Mr Ehrenberg had given a lead with their very successful method of judging white fish and achieved high levels of precision for this kind of work. However, the kipper presents a rather more complex problem. Perhaps first of all one should say a little about the smoking process, since most of us, understandably enough, have only a very sketchy idea of the various steps involved.

After the herring have been caught and transported to the kipper factory they are split down the back, gutted and cleaned by machine. Then, for a varying period of time, they are immersed in a vat containing brine and dye and finally placed in a kiln and smoked. The process is itself fairly simple, but a great many variations are possible at every stage from before catching to the actual sale from the fishmonger's slab.

The principal variations in the original fish are those of size and of fat content. The smaller the fish the quicker they absorb both brine and smoke, so that the smoking process must take size into account. The fat content, which varies at different seasons from about 25% to 2 or 3%, is responsible for the general texture of the kipper. Those with a low fat content tend to be rather dry and tough.

These variations are to a large extent beyond control. The same cannot be said of those resulting from transport; first by boat to the port and then by road or rail to the factory. In fact, the fish are seldom kept cool enough, and since herring can deteriorate very badly indeed in a matter of a few hours, they are often becoming stale by the time they enter the kipping factory.

The smoking process itself has altered over the years. Where formerly, before the First World War, the colour of the kipper was obtained entirely by smoke, it is now largely produced by the inclusion of a dye in the brining vat. As a result there is reason to suppose that herring can be smoked for a much shorter time. Thus the moisture loss taking place in the kiln (and also the weight loss) is far smaller than it was formerly. Since the two parallel processes, the deposition of smoke and the loss of

* When Dr Robinson read this paper at the Annual Conference of the British Psychological Society, Hull, 1960, in the symposium on Food Assessment and Food Acceptance, he was a member of the M.R.C. Neuro-psychiatric Research Unit, Whitchurch Hospital, Cardiff. Formerly he had been a D.S.I.R. Research Assistant in the Department of Psychology, University of Hull.

moisture, are important parts of the smoking process, it becomes quite clear that modern kippers are by traditional standards not properly smoked and are therefore very little less perishable than fresh herring. This the retailer has been rather slow to realise, with the result that the kipper may often be stored too long in unsuitable conditions.

Here then is the background of the study: an extremely perishable food product going through several stages from its source to the consumer, and somewhere in the chain there is the suspicion that all might not be well. The industry approached the Humber Laboratory on the subject some years ago. It seemed that some sort of grading system might enable them to improve the general quality of their product. Accordingly, the Laboratory set up a taste panel and began to compare the products of the various factories and to give the industry a rough idea of the eating quality of its product as supplied to retailers.

When the Psychology Department of the University of Hull became interested in the problem it was hoped that a system might be devised whereby a more accurate assessment might be made; an assessment that might include, say, an estimate of how long the fish was stored before curing, of how long it was smoked, of the condition and strength of the brine, and of the period that had elapsed since smoking. These are only four of the factors that a taste panel might be capable of assessing, but even these eventually proved to be too many for our panels. However, such assessments would be very useful, if they could be made, in operating some kind of grading system.

In practice the first problem was to find out whether tasters could distinguish between kippers treated in various different ways. Many trials were made, a selection of which I shall summarize briefly here.

All kippers used in the experiments were prepared in a mechanical kiln in which both temperature and smoke could be accurately controlled. They were prepared from stocks of properly frozen and cold stored herrings. The experience of Dr Burgess's taste panel suggested that cooked flavour might be the most fruitful aspect to study, and since time and manpower were both very short, only cooked flavour was assessed. Fish were cooked by steaming in a casserole for 35 minutes.

The type of judgment used in this work was different from that of the white fish techniques in that it was a comparative rather than a grading judgment. The object of tasting was not to give a grade number to each sample or to categorise it, only to arrange a number of samples in a certain order. Generally tasters were asked to arrange samples by taste in the order in which they would most likely be arranged by knowledge of treatment.

A score was derived by counting the number of correctly placed pairs. Thus, if there were three fish A, B and C, C being the freshest and A the least fresh, then the arrangement CBA would score points for correct placing of the pairs, CB, BA and CA; three points in all. The arrangement BAC would score a point for the pair BA but not for either CB or CA because these were placed in the wrong order.

Tasters were from two sources. One group consisted of members of the

Humber Laboratory staff, all of whom had had experience of tasting with Dr Burgess's panel. The disadvantage here was that the maximum number of people on the panel was about six and it was by no means unusual for only four to be present at a tasting session, which is far too few for a panel of this type. The other group of tasters was composed of 24 university undergraduates. They had no previous taste panel experience, but after a period of training it seemed that by virtue simply of their number they could have a great advantage over the other panel. One difficulty of prime importance in this work was that of getting a reasonable quantity of data from a given amount of time and effort spent in preparation.

Several aspects of the problem were explored during preliminary trials. It had been thought initially, for instance, that a set of descriptive terms might be collected for the various flavours resulting from differences of storage and processing. However, tests with kippers prepared in different ways and stored for various lengths of time at different temperatures elicited rather few namable characteristics which could be said to be the typical results of any particular treatment. However, kippers with short storage periods generally had flavours described as 'bright' salty flavours, creamy throat flavours like those of tasty meat, sweet flavours, or clear smoky flavours. Kippers in a less fresh condition had various degrees of fish oily flavours, sardine flavours, cod liver oil flavours or rancid or bitter flavours. Whether the flavour of a particular kipper fell into the first or the second of these flavour groups seemed to depend on its freshness more than anything else; this important point was borne out to some extent in the later experiments. In practice the flavour names that were found were very useful in the experiments that I shall describe. Tasters were asked to judge the kippers using the flavour names as guides, since they had all proved able to recognise them during the preliminary tasting work.

The smoke flavour, incidentally, is probably the limiting factor in finding a large and varied collection of flavour names for kippers in various states of deterioration. This is the greatest difference between this problem and Dr Shewan's white fish problem. The smoke and the generally very strong flavour of the kipper make taste panel work difficult.

A further difficulty, one which does in fact, I believe, call into question the value of attempting this kind of work without a very great deal of background study, is the fact that the variability within a batch of deep-frozen herring seems to be large. Perhaps they are landed under slightly different conditions according to the boat that lands them; the exact reason is obscure. Also the smoking process is so very difficult to standardize that one cannot guarantee that herring smoked on different days but otherwise similarly treated will have exactly similar flavour characteristics even though they are smoked in a mechanical kiln. The actual kiln *may* give consistent results; I suspect in fact that within very wide limits the actual smoke deposition is not very important. But the thawing of the fish from the frozen stock, the moving about and the variations of temperature during gutting and brining are very difficult indeed to standardize. For experi-

mental purposes treatment differences must be so large as to dwarf uncontrolled differences. It would have been an impossible task, because of the shortage of time and tasters and because of the perishable nature of the kipper, to test each time fish were tasted whether such dwarfing had been achieved. Thus a limit is set both to the accuracy of judgment by a taste panel and to the usefulness of any judgment they make. No doubt the generally fairly high percentage of errors in arranging kippers in order of freshness was due to these factors.

The first experiment I shall describe was one in which it was decided to try to find out whether storage variations caused detectable flavour differences. The small Humber Laboratory panel was used because the university panel had as yet had very little training.

Five groups of kippers were prepared; two groups were stored as herring (*i.e.*, after thawing from the frozen state) for five and ten days respectively in ice, and then smoked; one group was smoked immediately after thawing and two groups were smoked and then stored for two and five days respectively at 20° C. The smoking process was the same throughout these experiments.

Tasters were told the details of preparation and were asked to identify each fish. A scoring system was devised which gave top scores for correct identification and slightly lower scores where tasters distinguished only the stored fish from the others and confused the two modes of storage. The results showed that there was a trend towards correctness in the scores as a whole but very few top scores were made; that is, tasters could not reliably discriminate between the fish stored as herring and fish stored as kippers. The trend towards correctness does seem to indicate that differences in general freshness were discernible however (Figure 1).

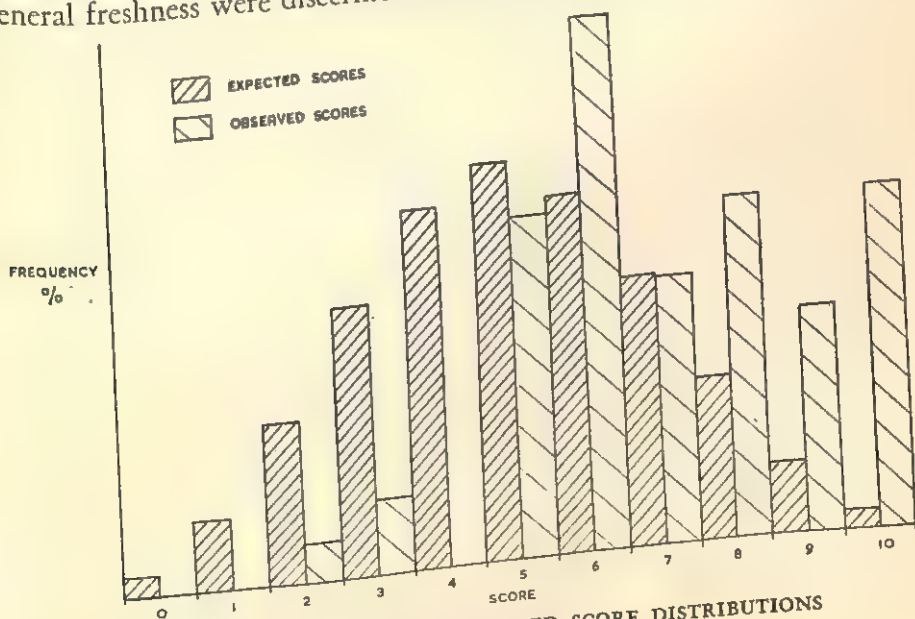


FIG. 1: EXPECTED AND OBSERVED SCORE DISTRIBUTIONS

It seemed then that the panel could not tell the two kinds of storage apart; previously we had been rather optimistic that they might. Previously too we had been fairly sure that the purity of the brine used had a discernible effect on the kippers produced. The next step was to test this, and the university panel was used.

Polluted brine (brine through which a great many fish have passed) was thought to have an adverse effect on both the flavour and the keeping quality of kippers. These ideas were derived from work with Dr Burgess's panel.

In this experiment four groups of kippers were made. Two were brined in fresh brine and two were brined in polluted brine (brine obtained from a vat in use at a kipper factory). One group from each pair of groups was stored for 10 days after smoking. Thus there was a group of kippers brined in fresh brine and stored for 10 days after smoking, a group brined in old brine and stored for 10 days after smoking, and a group brined in each brine and tasted immediately after smoking. It should be added that all tasting was done on the same day, so that in fact the stored kippers were made 10 days earlier than the rest and the old brine was frozen and then used again for the freshly smoked group.

Each taster was presented with two pairs of fish and was asked to state which fish of each of the pairs had the fresher flavour. One pair contained the two fish stored for ten days and the other contained the two that were freshly smoked. Thus the comparison was in one case between fresh and old brine in freshly smoked kippers and in the other case between fresh and old brine in kippers stored for ten days after smoking. If the brine had an immediate effect on the flavour one would expect good discrimination only on the stored pair where the effect of the old brine had had time to make itself felt.

In fact there was good discrimination on neither pair. The results showed only that the discrimination between the stored kippers was very slightly better. The results did not however, show any significant deviation from chance.

The third and last experiment I shall describe set the university taste panel the problem of sorting out three kippers which differed in length of storage between thawing and smoking. They had in fact to try to arrange the three kippers in order of freshness. In two trials out of four the score distribution differed very significantly from chance in the direction of correctness (*i.e.*, in the direction of an arrangement corresponding to the arrangement according to treatment). Once again then, the panel seem to have been able to achieve a measure of success in assessing kippers for general freshness (Figure 2).

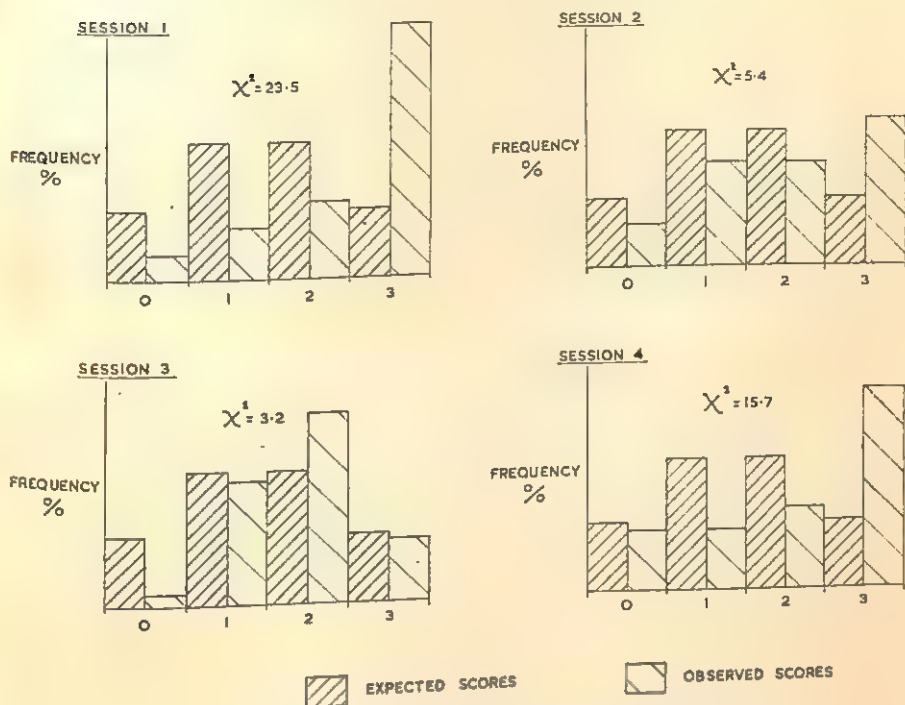


FIG. 2: SCORE DISTRIBUTIONS FOR THE FOUR TRIALS

These experiments will show that success of the two panels in making accurate assessments of kippers was very limited, and in fact the more detailed objectives of the work were not achieved. It did not prove possible to detect differences of flavour resulting from differences of type of storage or condition of brine. The smoke variable and the moisture loss variable were not tested. Moreover, one would consider it unlikely, in the light of experience gained in this work, that fine differences of any one process or spoilage variable will be assessable by taste panel. A far more realistic hope, is and one which is in the minds of those still concerned with the problem, that a group of advisors recently appointed will acquire special knowledge and experience of the curing procedure, which will enable them to make some kind of assessment and to give advice on smoking procedure. It is hoped that taste panel methods will be useful to them in the assessment of the effects of *faults* in storage and *faults* in processing, as distinct from the assessment of the many variables that operate as a matter of course.

It is this detection and correction of faults that I believe now to be the most useful application of taste panel techniques. Work which does not give results promptly can hardly be relevant in the present difficulty where sales appear to have declined and the industry is trying to find a way of improving the situation, but this work has given some indications which might well be relevant to the present difficulties.

As I have said, an assessment of general freshness did seem to be feasible,

and the few commercial kippers tasted by our panel fell well below most of those made experimentally when assessed for general freshness. Furthermore, with very few exceptions tasters in the university panel preferred the kippers they were called upon to taste to any they had previously tasted.

It would certainly be interesting to know whether people in general can tell the difference between kippers prepared under ideal conditions and the kind generally found in the shops. If it could be shown that they can in fact make such a discrimination, the case for a general improvement of quality would be greatly strengthened.

ACKNOWLEDGMENTS

The author wishes to express his thanks to the staffs of the D.S.I.R. Humber Laboratory, Hull, and the Psychology Department of the University of Hull for their co-operation in this work; also to the D.S.I.R. for its support.

Intelligence and Wastage of Student Mental Nurses

By T. G. CROOKES and J. G. FRENCH

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SINCE 1952 all student mental nurses entering the above Training School have been given, in group form, Raven's Progressive Matrices test (1938), untimed. This was not a selection procedure. Many of the students came from overseas and had been accepted on written application. The study was mainly a research project to see how well the results correlated with success in examinations and with wastage on the course. All the students trained on the 1952 syllabus (a new syllabus was introduced in 1957) have now either passed their final examination or have left without completing the course, so it is possible to look into the correlations. Apart from the question of choosing student nurses, some of the findings raise points of some relevance to general problems of occupational selection.

RESULTS

Overall figures

There are 136 students in the period investigated, 102 girls and 34 men. Fifty-two passed their final examination and 84 left without doing so. The distribution of their Matrices scores is similar to that of the general population. Table 1 shows the correlation between Matrices score and success in the examinations taken at various stages in the course. The P.T.S. examination was taken at the end of the initial 3 months' teaching in the Preliminary Training School. This was only taken once, but failure in it did not prevent the student from continuing the course. In the period concerned the preliminary examination was in two parts, both of which had to be passed before the student could continue. The table compares those who passed both parts at the first attempt with those who failed one or more. Many of those who did so passed on later attempts; the results of the first attempts are used, because the aim was to correlate Matrices score with academic ability, rather than persistence. The same applies to the Final Examination. Matrices grades are shown in four divisions corresponding with the four successive quarters of the general population. Biserial correlation coefficients were calculated from the raw scores on the test.

Table 2 shows the correlation of Matrices with wastage. Those who eventually passed their final examination are compared with those who left without doing so.

TABLE 1: CORRELATION OF MATRICES SCORES WITH EXAMINATION SUCCESS

		MATRICES GRADES				
		5 & 4	3—	3+	2 & 1	
P.T.S.	Passed	4	10	13	30	Bis. $r = +.53$
	Failed	30	13	21	12	
Prelim.	Passed both	8	8	14	20	Bis. $r = +.32$
	Failed one or both	12	8	11	9	
Final	Passed	9	8	12	15	Bis. $r = +.21$
	Failed	3	5	1	3	

TABLE 2: MATRICES SCORES AND WASTAGE

			MATRICES GRADES				
			5 & 4	3—	3+	2 & 1	
Passed Final	..	..	11	12	12	17	Bis. $r = +.03$
Left without	..	..	24	11	23	26	

Matrices score has a fair correlation with success in examinations (though it is smaller at each stage), but there is no correlation between Matrices and eventual completion of the course; the 3— group has the biggest proportion of successes, the other three groups being all very similar. A decrease of correlation at successive examinations might be expected, owing to the groups becoming more selected at each stage; but this does not appear to be the case here, since the proportion of students in each Matrices grade is very similar at each stage. It seems likely that other factors (*e.g.*, application) become more important at successive stages.

National and Sex Differences

Many students are from overseas and it is desirable to distinguish them in case the findings are due to the peculiarities of some particular group. The non-English speaking group (N.E.S.), mainly French and German, was separated from those whose native language was English. The English-speaking students were then divided into Home (including Irish) and West Indian. Table 3 shows the number of students and wastage in each of these groups, distinguished also by sex.

It will be seen that within each sex the proportion of leavers does not differ greatly among the three national groups. The males in general have a greater wastage than females, 79% as opposed to 56%.

TABLE 3: CONSTITUTION OF THE 3 GROUPS

GROUP	FEMALE		MALE	
	N	NUMBER WHO LEFT	N	NUMBER WHO LEFT
Home	33	18	26	20
W.I.	33	16	4	4
N.E.S. ...	36	23	4	3

Correlations were worked out for the three national groups separately between Matrices and wastage, and between Matrices and P.T.S. examination results. This examination was chosen as having the best correlation with Matrices and also since it was taken by the largest number of students. These correlations are shown in Table 4.

TABLE 4: CORRELATION OF MATRICES WITH WASTAGE AND P.T.S.

GROUP	N	CORRELATION (bis. r)	
		MATRICES/P.T.S.	MATRICES/EVENTUAL SUCCESS
Home ..	59	+.58 (N=56)	-.17
W.I. ..	37	+.66	+.53
N.E.S. ..	40	+.44	-.14

The three groups all show a positive correlation between Matrices and P.T.S. results, but the West Indian group differ markedly from the other in showing a positive correlation between Matrices and eventual completion of the course. It is reasonable to expect that, having come so far with the express purpose of becoming qualified nurses, they would be likely to persevere to the end if they were capable of doing so. Some of the N.E.S. group, on the other hand, may well have come mainly to learn English. The West Indian group also have lower Matrices scores, on the average, than the other groups (mean 32.7, while the Home and N.E.S. means are 43.2 and 46.6 respectively), and contains a larger number of students who were simply not up to the course intellectually; their failure contributes to the positive correlation. The Home group is of most interest in practice and no special considerations affect the results; they show clearly the positive correlation of Matrices with examination ability and a slight negative correlation with success on the whole course.

An incidental question which is raised by the findings is that of the validity of the Matrices for the West Indian students. Many of these have scores which are curiously low for their educational records, and they were considerably more successful in examinations, for their Matrices score, than the others. They had a bigger proportion of successes in the P.T.S. examination (15 out of 37) than the Home group (21 out of 56), although their mean Matrices score was 10 points lower. This could be partly explained

by the motivational factors mentioned above, but it may be of some cultural significance in view of the findings of Higgins and Sivers (1958). They took two groups of children, one negro, one white, from comparable backgrounds, and tested them with the Matrices and Binet test. On the Binet test the two groups were almost the same, but the negro children were significantly worse on the Matrices.

Reasons for Leaving

The 84 students' reasons for leaving were grouped into 3 main categories: A (16 cases), where the reason implied the student's dissatisfaction with the job; 7 of these (all men) gave financial reasons, 6 said they disliked the work, and 3 changed to a general hospital: B (35 cases), where the reason was relatively neutral, due to outside factors; there were 26 domestic reasons (marriage in the case of 17 girls) and 9 cases of ill-health: C (33 cases), where the reason implied that the students did not come up to the hospital's standard; 11 were advised to leave for academic reasons, 18 because they were considered unsuitable in other ways, and 4 were dismissed for misconduct. Table 5 shows the relationship between the three categories and Matrices grades.

TABLE 5: REASONS FOR LEAVING AND MATRICES

REASON	MATRICES GRADES				TOTAL
	5 & 4	3—	3+	2 & 1	
A Student's dissatisfaction ..	2	4	3	7	16
B Neutral	5	3	11	16	35
C Hospital's dissatisfaction ..	17	4	9	3	33
TOTALS	24	11	23	26	84

Groups A and B are similar in that they contain a majority of students in the upper half of the Matrices scale, while group C shows the opposite trend. Although the reasons given in group B are, on the face of it, extraneous, some of them suggest no great enthusiasm for the work. Some of the domestic reasons, *e.g.*, having to look after aged relatives, may have been unavoidable, but marriage could have been postponed until after the Finals, if the student had been really keen. Health reasons, also, admit of various interpretations. If the Matrices distribution of those whom the hospital authorities wished to leave (C) is compared with that of those whom they did not (A and B) we get $\chi^2 = 11.75$, $df = 3$, $p < .01$.

DISCUSSION

Since the war, there has been much discussion and investigation of the problem of wastage of nurses. Houlston (1946) examined the advantage of screening candidates by means of an intelligence test. Petrie and Powell (1950) and Lee (1959) devised batteries of intellectual and personality tests which correlated highly with scores of suitability based on ratings of a

number of traits, made by members of the staff familiar with the subjects. The aim of these procedures is to select those applicants who are most suitable, those most likely to be judged, when the time comes, to be good nurses, to make a high score on the criterion scale devised. This laudable object is the aim of most selection procedures, to pick out the applicants who are likely, for intellectual and other reasons, to be best able to do the job concerned. What this investigation illustrates is the need to distinguish between 'suitability' and the question of whether the applicant is going to stay or not. Intelligence is positively correlated with suitability; in the two batteries mentioned above, scores on the intelligence tests showed significant correlations with the criterion of suitability. Clearly, other things being equal, a more intelligent candidate will be preferred. In this investigation, except for one group where special considerations obtained, intelligence as measured by the Matrices showed a small negative correlation with completion of the course. The point comes out most clearly in the analysis of reasons for leaving. Those who left because they were considered unsuitable were of considerably lower intelligence than those who left for their own reasons. It could, of course, be argued that the students who left showed themselves *ipso facto* to be unsuitable and that tests should be devised which would pick out those who were likely to leave though otherwise suitable. This could probably be done (the scale would include a small negative loading on intelligence, if our results are valid, and, for the girls, a negative loading on a measure of marriageability); but this is a circular process which depends on defining 'suitability' in a way which disagrees with ordinary usage and is also unhelpful. It would be the logical procedure if the aim were simply to minimize wastage; but this is clearly not so, since the aim is also to get the best possible people for the job. The difficulty is that these aims can to some extent be at variance with each other, as they appear to be in this case.

In a routine type of job, where excess ability over a certain degree cannot in any case improve the quality of work, the employer may realize the inadvisability of employing people who are 'too good' for the job, but in a professional type of job such as nursing he cannot take this attitude, since the job gives scope for any amount of ability (this includes other qualities besides intellectual ones) and greater ability continues to give better results. If it is found that the better candidates tend to leave, you cannot, as in the routine job, lower your standards to include more of the less able people, who may be more likely to be satisfied, since this sets up a vicious circle. The status of a job is judged by the minimum standard required for it; as this is lowered, it becomes less attractive to the more able. The only solution is to raise the standard; this, of course, means eliminating more applicants, but it should result in less wastage of the better ones and, at later stages, applicants of better quality.

In the practical situation, nursing has the peculiarity of having different standards in different places. The large teaching hospitals can, for instance, apply higher standards than hospitals such as this one; they get applicants

of better qualifications, for reasons of geography and prestige. In addition, in small teaching units such as this, classes are not usually big enough to split into sections, so that the pace has to be geared to the slowest students, to the dissatisfaction of the quicker ones. In many cases it may be necessary to lower the standard simply to get the number of nurses required. If so, it is desirable to adopt a system like that recommended by Haward (1960) of adapting the training to the capacity of each individual. The duties of a nurse are extremely varied, and as Haward points out, a nurse of modest intelligence is capable of learning to perform many of them adequately. This, however, is an interim measure, and will not halt the vicious circle effect described above, as long as abilities of such wide variety are included in one professional category. The solution will probably lie in making a division on the American model, making fully qualified nurses a relatively small highly selected group, with a corresponding widening of the category of State Enrolled Assistant Nurse.

SUMMARY

The progress of 136 student mental nurses, up to passing their final examination or leaving without doing so, was examined in relation to their score on Raven's Progressive Matrices test (1938), untimed. It was found that the score correlated quite highly with examination success, but not at all with eventual completion of the course. When divided into three groups, Home, West Indian and non-English speaking, they all showed a positive correlation between Matrices and examination success, but whereas the West Indians showed a positive correlation between Matrices and completion of the course, the others showed a small negative correlation. When reasons for leaving were considered, those who left because they were considered unsuitable by the hospital were predominantly of low Matrices score; those who chose to leave tended to have high scores. The findings were discussed in relation to general problems of occupational selection and the particular problem of nursing recruitment.

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Sydney Smith as a Psychologist: A Study in Biographical Psychology*

By T. M. HIGHAM

"THIS astonishing place, which, I think, exhibits a scene of commercial opulence and activity equal to anything I have seen in London." So wrote Sydney Smith of Liverpool in 1798. Both the date and the visit are relevant to the subject of this paper. Sydney Smith was on his way to Scotland: a 27 year old clergyman, a scholar, of both Winchester and New College, engaged as tutor to the son of a Gloucestershire squire. Had it not been for the war in Europe, he and his pupil would have gone to Germany. We can be thankful that they went to Edinburgh instead, even if Sydney Smith did refer to it as 'energetic and unfragrant'†; for Edinburgh at that time was in the autumn of her reputation as 'The Athens of the North'.

If Adam Smith and David Hume were becoming legends, a new generation was rising—a generation, in particular, of brilliant young Whigs; men 'neither rich nor ashamed of being poor'. They included Henry Brougham, Francis Horner and Francis Jeffrey, chief among Sydney Smith's fellow founders of *The Edinburgh Review*; and the sons of several English peers, who 'were drawn to the University partly by the restrictive statutes of Oxford and Cambridge, but still more by the genius and learning of such eminent professors as Dugald Stewart and John Playfair'. Sydney Smith was soon at home in their company. From his five years in Edinburgh, he derived constant intellectual stimulation; but from Dugald Stewart's lectures, on moral philosophy, came an interest in the science of mind—an interest sharpened and illuminated by the medical lectures he also attended.

If his medical knowledge was to prove of value during his years as a country parson in a remote Yorkshire parish 'twelve miles from a lemon', he was able to put what he had learnt from Stewart and his colleagues to more immediate use. For in 1803, married, and with a young family, he left Edinburgh for London. For the next four years he lived partly on his earnings as a preacher and as a contributor to *The Edinburgh Review*, but also on the proceeds of two seasons of successful lectures at the Royal Institution—on Moral Philosophy. The lectures filled the hall to capacity, but he was modest about his achievement; in a letter to Jeffrey, he writes: "I am most heartily ashamed of my own fame, because I am conscious I do not deserve it, and that the moment that men of sense are provoked by the clamour to look into my claims, it will be at an end." Nearly 40 years later he wrote of his lectures: "Every week I had a new theory about conception

*A paper read at the 1961 Annual Conference of the British Psychological Society, Liverpool.
†and to the Scots as 'lean, lousy and logical'.

and perception, and supported it by a natural manner, a torrent of words, and an impudence scarcely credible in this prudent age." Francis Horner said of them: "Who else could make such a mixture of odd paradox, quaint fun, manly sense, liberal opinion, striking language?"

But Sydney Smith had no very high opinion of their merit; some of them he used later, in his articles in *The Edinburgh Review*, others he burned—and would, indeed, have burnt the remainder had not his wife dissuaded him. They were published four years after his death, with a disarming preface by his wife:

These lectures (she writes) from the circumstances under which they were delivered were necessarily very superficial, it being impossible to fix the attention of persons wholly unaccustomed to such abstruse and difficult subjects, with any beneficial effect for the prescribed time of the lecture.

The preface concludes with these words:

Though very far from a learned book, it may prove perhaps an interesting one, conveying great truths, and much useful knowledge, in a less dry and repulsive shape than in a discussion of moral philosophy they are commonly to be found.

I think Mrs Smith was over-modest. Her husband's lectures are still fun to read; and in many ways they are surprisingly up to date.

Sydney Smith was a prolific writer, rarely revising the flow of ideas and words which came to him. Yet he said, "Words are an amazing barrier to the reception of truth", while a comparison of his style on different occasions shows how sensitive he was to their use. He adapts his style perfectly to his audience; he is blunt and direct in his 'advice to parishioners'; eloquent in his sermons; facetious and involved in the clever young man's magazine *The Edinburgh Review* (likened by Lord David Cecil to *The New Statesman* of its day); acute, indignant and often irresistibly funny, piling one ridiculous image on another, in his polemical writings; full of gossip and good humour in his letters; urbane, erudite and brisk in his lectures, conscious of the fashionable and literary world who thronged the Royal Institution.

His lectures covered such topics as perception and conception; memory, imagination and thinking; aesthetics; wit and humour. Unlike many who wrote on the last two, he was richly endowed with both. He had little time for abstract philosophy. Take, for example, this letter to Lady Holland: "I take the liberty to send you two brace of grouse, curious because killed by a Scotch metaphysician; in other and better language, they are mere ideas shot by other ideas, out of a purely intellectual notion called a gun". Again and again in reading the lectures one comes across remarks thrown out at random, which have an oddly contemporary ring.

On 'communication', for example, he is remarkably up to date. He is aware of what we now call 'the frame of reference':

*It is not in our power to believe all that we please; our belief is modified and restrained by the nature of our faculties, and by the constitution of the objects by which we are surrounded.**

* This, perhaps, was why he once said, "I never read a book before reviewing it, it prejudices a man so".

and of the influence of early associations on later beliefs:

A man has heard such opinions very often or, "I have heard them when I was young; and therefore they must be right";—"I hate all Dissenters", or "all Roman Catholics"—or, "I cannot endure Americans"—and such other shocking opinions, upon which men act all their lives,—and act very badly and furiously, and very ignorantly, merely because such opinions have been instilled into their earliest infancy, and because they have never had the power of separating two ideas which were accident first associated together.

So it is not surprising that he is interested in the meaning of words and what they convey to those who speak them and those who listen to them. 'Definition of words', he writes:

has been commonly called a mere exercise of grammarians; but when we come to consider the innumerable murders, proscriptions, massacres and tortures, which men have inflicted on each other from mistaking the meaning of words, the exercise of definition certainly begins to assume a more dignified aspect.

In fact at the very beginning of his lectures he is concerned about the proper words to describe 'the science of the human mind'. 'Psychology and pneumatology are both candidate expressions for filling this vacancy in our language', he says, and goes on:

but though no objections can be stated to either, they have neither of them fairly got into circulation (even among the few, who by cultivating 'his science have acquired a right to adjust the language in which it is taught)

I think we can be grateful that pneumatology did not catch on: I should find it difficult to call myself an industrial pneumatologist; although, perhaps, 'the science of people who breathe' comes a little closer to present day definitions.

His descriptions of how a child comes to know fear will, despite its associationist overtones, stand comparison with the classic description of Albert and the Rat. Allport, I feel, would have approved this account of functional autonomy.

A walk upon the quarter-deck, though intolerably confined, becomes so agreeable by custom that a sailor in his walk on shore very often confines himself within the same bounds. "I know a man", says Lord Kames, "who had relinquished the sea for a country life: in the corner of his garden, he reared an artificial mount, with a level summit, resembling most accurately a quarter-deck, not only in shape, but in size; and here he generally walked."

On self-esteem his views are akin to those of William James; indeed, he is almost Adlerian in his statements that 'the strongest of all our desires seems to be the desire of esteem' and 'Men are shot and hacked to pieces from the hope of gaining esteem, or the fear of losing it'. Earlier he says:

Reputation is one of the prizes for which men contend . . . it produces more labour and more talent than twice the wealth of a country could rear up. It is the coin of genius; and it is the imperious duty of every man to bestow it with the most scrupulous justice and the wisest economy.

Hence one of his better known remarks: 'Among the smaller duties of

life, I hardly know any one more important than that of not praising where praise is not due.' This has been well enough established by later studies on learning.

Another extract anticipates Maslow's theory of a hierarchy of basic needs:

No-one is so inclined to good nature, courtesy and generosity when cold, wet, and dirty, as after pleasant feeding and during genial warmth.

He realized the value of good selection. Hear him, for example, on the need to do what you are best suited for:

Whatever you are from nature, keep to it; never desert your own line of talent. If Providence only intended you to write posies for rings, or mottoes for twelfth cakes, keep to posies and mottoes; a good motto for a twelfth cake is more respectable than a villainous epic poem in twelve books. Be what nature intended you for and you will succeed; be anything else and you will be ten thousand times worse than nothing.

And I wonder how many of my colleagues know that Sydney Smith originated the often quoted phrase about 'square pegs'? The original is so much better that it deserves quoting in full:

It is a very wise rule in the conduct of the understanding to acquire early a correct notion of your own peculiar constitution of mind, and to become well acquainted, as a physician would say, with your idiosyncrasy. Are you an acute man, and see sharply for small distances, or are you a comprehensive man, and able to take in wide and extensive views into your mind? Does your mind turn its ideas into wit? or are you apt to take a commonsense view of the objects presented to you? Have you an exuberant imagination, or a correct judgment? Are you quick or slow, accurate or hasty? a great reader or a great thinker? It is a prodigious point gained if any man can find out where his powers lie, and what are his deficiencies — if he can contrive to ascertain what Nature intended him for: and such are the changes and chances of the world, and so difficult is it to ascertain our own understandings, or those of others, that most things are done by persons who could have done something else better. If you choose to present the various parts in life by holes upon a table, of different shapes—some circular, some triangular, some square, some oblong—and the persons acting these parts by bits of wood of similar shapes, we shall generally find that the triangular person has got into the square hole, the oblong into the triangular, and a square person has squeezed himself into the round hole. The officer and the office, the doer and thing done, seldom fit so exactly, that we can say they were almost made for each other.

But perhaps he spoke with feeling on this point; he had wanted to follow his elder brother and take up law; but his father felt that one barrister in the family was enough. None the less, he was punctilious in carrying out his clerical duties, and strongly disliked anything which savoured of scepticism or irreligion. He once wrote to Francis Jeffrey:

I exhort you to restrain the violent tendency of your nature for analysis, and to cultivate synthetical propensities. What's the use of virtue? What's the use of wealth? What's the use of honour? What's a guinea but a damned yellow circle? What's a chamber pot but an infernal hollow sphere. The whole effort of your mind is to destroy. Because others build slightly and eagerly, you employ yourself in kicking down their houses and contract a sort of aversion for the more honorable, useful and difficult task of building well yourself.

Sydney Smith's attitude to his father was rather ambivalent; and, not surprisingly, so was his attitude towards his clerical superiors. Many of his witticisms were directed against his fellow clergy and the bishops. Some of them have a wider application even today—"A curate trod on feels a pang as great as when a bishop is refuted", for example. Others are more savage: "I must believe in the Apostolic succession, there being no other way of accounting for the descent of the Bishop of Exeter from Judas Iscariot"; and his remark on seeing a lady at a dinner party, with a bishop on either side: "Susanna, I presume". Yet at one time he would have liked to have been a bishop—more for personal than for pastoral reasons, I must admit. And although Lord Melbourne is said to have remarked that not to have made him a bishop was 'mere cowardice', it is understandable that they did not. After all, he had said of the Established Church: 'All establishments die of dignity. They are too proud to think themselves ill and to take a little physic.' Of a bishop of his day he remarked: 'There is nothing pompous gentlemen are so much afraid of as a little humour.'

And then there was the question of the Peter Plymley letters, which Sydney Smith wrote anonymously, and published in 1807. They were a plea for justice for the Catholics—at that time denied most civil rights—and their irony, good humour and commonsense gave them a wide circulation. Although it was not known for some time that he was the author, it hardly furthered the cause of his own preferment in the predominantly Tory Establishment, which resented his laughing at them and making them figures of fun. In fact, he once referred to his brother and himself as exceptions to the laws of nature. 'You have risen by your gravity and I have sunk by my levity.'

The year before the Peter Plymley letters were published, Sydney Smith was presented with the living of Foston in Yorkshire, and in 1809 (when the Clergy Residence Act was enforced) he moved his family north. There was no proper parsonage at Foston and for five years he lived at Heslington outside York. In 1813 he began to build his own rectory, incorporating in the design several items of an almost ergonomic nature, notably a fire which drew in air from under the floor and a device for securing his fire irons. This ingenuity was extended outside to the 300 acres of his glebe: he invented a Universal Scratcher, 'a framework so contrived, that every animal from a lamb to a bullock can rub and scratch itself with the greatest facility'. He also devised a patent Tantalus, to encourage his sluggish horse, Calamity: a sieve of corn was fastened to a semicircular iron bar and mounted on the shafts of his trap, so that it was just beyond the horse's nose, thus stimulating it to 'prodigious exertions'. He used a vast speaking trumpet to communicate with his labourers when they were in the fields, supplementing his instructions with a telescope to see they were carried out. He even had made a suit of rheumatic armour which he could fill with hot water and put over the afflicted parts (especially those he termed his 'professional' joints). He was Rector of Foston from 1809 to 1829. During all this time he continued to contribute to *The Edinburgh Review*, and many of his articles

—especially those on education and prisons—reflect the sentiments and ideas put forward in his lectures. He ceased to contribute when he became a Canon of Bristol in 1828. He moved to Somerset in 1829 and two years later became a Canon of St. Paul's. From then until his death fourteen years of him written by his daughter after his death, and in his occasional speeches, there are plenty of examples of his lively interest and observation of people and events. In his letters, too, there are many surprises tucked away among the gossip, the jokes and the riotous exuberance of his fancy. Take for example this comment, and compare it with Dr N. H. Mackworth's findings:

Very high and very low temperatures extinguish all sympathy and relations. It is impossible to feel any affection beyond 78° or below 20° Fahrenheit. Human nature is too solid or too liquid beyond these limits. Man only lives to shiver or perspire.

Or his psychosomatic diagnosis:

Old friendships are destroyed by toasted cheese, and hard salted meat has led to suicide. Unpleasant feelings of the body produce corresponding sensations in the mind and a great scene of wretchedness is sketched out by a morsel of indigestible and misguided food. Of such infinite consequence to happiness is it to study the body.*

One of my favourite quotations come from his advice to Earl Grey, just before the passing of the first Reform Bill in 1832:

Pray keep well, and do your best with a gay and careless heart. What is it all but the Scratching of Pismires on a heap of Earth—Rogues are careless and gay, why may not honest men? Think of the bill in the morning, and take your Claret in the evening totally forgetting the bill.

Here and there, one comes across comments of a more sociological kind, or of interest to those who study the psychology of politics. Dr T. T. Paterson's concept of 'external prestige', for example:

The greater the quantity of respect a man receives independently of good conduct, the less good is his behaviour likely to be. It is in the interest, therefore, of the public in the case of each, to see that the respect paid to him should, as completely as possible, depend upon the goodness of behaviour in the execution of his trust.

While many personnel managers, and politicians too, might benefit from pondering this comment:

My firm belief is that England will be compelled to grant ignominiously what she now refuses haughtily . . . If you think the thing must be done at some time or another, do it when you are calm and powerful and when you need not do it.

One might even claim that Sydney Smith was an originator of market research. Take, for example, this passage from his second letter to Archdeacon Singleton:

* He once wrote, "I am convinced digestion is the gretat secret of life", so I suspect he would have approved of Brillat-Savarin's classification of mankind according to the last act of the digestive process, into the regular, the relaxed and the reluctant. Sydney Smith's doctor once told him to take a walk on an empty stomach. He replied, "Whose?"

I am astonished that these Ministers neglect the common precaution of a foolometer, with which no public man should be unprovided: I mean, the acquaintance and society of three or four regular British fools as a test of public opinion. Every Cabinet Minister should judge of all his measures by his foolometer, as a navigator crowds or shortens sail by the barometer in his cabin. I have a very valuable instrument of that kind myself, which I have used for many years; and I would be bound to predict, with the utmost nicety, by the help of this machine, the precise effect which any measure would produce on public opinion.

Sydney Smith had a keen interest in what would now be called Mental Health: his review of Tuke's *History of the Retreat* is especially interesting. So, too, is his advice to Lady Morpeth on curing low spirits:

Dear Lady Georgiana,

Nobody has suffered more from low spirits than I have done—so I feel for you.

1. Live as well as you dare.
2. Go into the shower bath with a small quantity of water at a temperature low enough to give you a slight sensation of cold, 75° or 80°.
3. Amusing books.
4. Short views of human life—not further than dinner or tea.
5. Be as busy as you can.
6. See as much as you can of those friends who respect and like you.
7. And of those acquaintances who amuse you.
8. Make no secret of low spirits to your friends, but talk of them freely—they are always worse for dignified concealment.
9. Attend to the effects tea and coffee produce upon you.
10. Compare your lot with that of other people.
11. Don't expect too much from human life—a sorry business at the best.
12. Avoid poetry, dramatic representations (except comedy), music, serious novels, melancholy sentimental people, and everything likely to excite feeling or emotion not ending in active benevolence.
13. *Do good* and endeavour to please everybody of every degree.
14. Be as much as you can in the open air without fatigue.
15. Make the room where you commonly sit, gay and pleasant.*
16. Struggle by little and little against idleness.
17. Don't be too severe upon yourself, or underrate yourself, but do yourself justice.
18. Keep good blazing fires.
19. Be firm and constant in the exercise of rational religion.
20. Believe me, dear Lady Georgiana,

Very truly yours,

Sydney Smith.

The self-revealing note at the start of that letter was true enough. His temperament was cyclic; Kretschmer could well have used him for an illustration. He was a prey to melancholia, with its consequent love of inertia. But he was not a 'rational' man, in the XVIIIth century sense, for nothing; he did not give way or abandon himself to his low spirits, or his desire for idleness. Like Dr Johnson, he put up a lifelong resistance to the

* He complained of Samuel Rogers' dining room, where the only light was reflected from the pictures that "above them is a blaze of light, and below, nothing but darkness and gnashing of teeth".

irrational—in himself as much as in others. Hence his dislike of methodism, 'enthusiasm', Puseyites, and the romantic school of poetry.*

One cannot claim more, for Sydney Smith as a psychologist, than that he was a keen observer of people and places, observing them through a frame of reference shaped by his own temperament, learning and inclinations, and gilded by his Whig philosophy. His life (1771-1845), as Professor Auden has pointed out, spans the years which separate the invention of the steam engine from Engel's *The State of the Working Classes in England*; years which included the Napoleonic wars, and saw the beginning of the revolutionary struggles for liberation; a period, if you come to think of it, not unlike our own. That, perhaps, is partly why he sounds so contemporary, and why his writings are of value today.

Indeed, on that, we can let him have the last word—in a letter to the press, written the year before he died. He begins with some verse:

*'The good of ancient times, let others state.
I think it lucky I was born so late.'*

and continues:

It is of some importance at what period a man is born. A young man, alive at this period, hardly knows to what improvements of human life he has been introduced.

He lists some of the material improvements of the preceding 70 years—gas lighting had replaced oil lamps; policemen had taken over from the old night watchmen; railways had ousted the coaches and the steam packet the sailing ship. Macadam had revolutionised roadmaking; the streets of London were paved with wood instead of cobbles; cabs were 'cheap and active'. Umbrellas, waterproof hats and braces had been introduced; advances had been made in medicine; Parliament had been reformed; the penny post had been started; the poor laws had been amended; and no longer 'even in the best society were one-third of the gentlemen at least always drunk'.

Then, after describing the disadvantages and difficulties of life before these benefits were brought about, he ends:

And yet, in spite of all these privations, I lived on quietly, and am now ashamed that I was not more discontented, and utterly surprised that all these changes and inventions did not occur two centuries ago.

* His portrait in the National Portrait Gallery faces one of Wordsworth at his most horse-like.

Three Comments on 'Training Made Easier'

THE Department of Scientific and Industrial Research have published, in their series of booklets called 'Problems of Progress in Industry', one on industrial training entitled *Training Made Easier*. It is available from Her Majesty's Stationery Office at two shillings. We have invited three experts to comment on it.

MR C. D. STRINGFELLOW writes:

One wonders how far there may be some connection between the use of the term 'semi-skilled' and the casual and unsystematic learning which has been allowed to persist far too long for a vast range of industrial jobs. Terms suggesting half-way targets are only likely to evoke half measures and this unfortunate term may perhaps be one reason why only casual regard seems to be paid to the real nature of activities involved, and consequently to the real nature of the training problem, in the so called 'semi-skilled' range of jobs. The fact that the workers themselves have difficulty in verbalising their experience, and critical analysis is beyond most of them, is another reason why the facility of the experienced worker is all too often taken for granted and assumed to be simply the result of practised physical movements which can readily be copied by the learner. In most 'semi-skilled' work, however, there is much more to the development of adroit performance than is apparent.

Training Made Easier, the most recent of a D.S.I.R. series of pamphlets aimed at presenting the results of recent researches, is a much needed reminder, both to managers and to staff who have specific responsibilities for worker training, that there are other components besides physical activity in tasks regarded as merely manual. It indicates most clearly that in all such tasks there are sensory and mental activities which must be recognised and understood before the real nature of the learning problems can be stated and the most suitable training methods developed.

Apart from the chastening experience of trying industrial tasks themselves it is probably only through increased awareness of the complementary nature of sensory, mental and physical activity in work performance that industrial management will appreciate the need for a much more systematic approach to their training problems. As the authors suggest, the pamphlet will have filled its aim if, through the fuller appreciation of the nature of industrial task learning and the knowledge of techniques to assist learning which it gives, "it causes managers to re-examine their own training methods and encourages improvements where necessary".

Unfortunately, there is an apparent duality of purpose in the format chosen for the pamphlet. The title, contents page and the careful enumeration of stages and aspects of learning and training all suggest a primer on training rather than a research report. Furthermore, whereas the preface suggests that the pamphlet is presented for the attention of personnel and training officers in particular, the final section on 'problems of application'

implies that its main aim is to stimulate the rethinking of line management. What a pity also that the title does not indicate specifically that the pamphlet is concerned with *operative* training and that in the chosen form of presentation the research results are not related to the individual researches reported (whose aims and titles for some strange reasons remain undisclosed throughout).

It would have been helpful also to those new to industrial training responsibilities if some distinction had been made between results which represent new findings or developments (e.g., the most useful sensori-motor process chart for job analysis) and those which should now almost be regarded as axiomatic (e.g., value of knowledge of results).

For these reasons and even though the authors warn against it some danger remains that, through its form and the classifications and categories used in the text, the pamphlet may be regarded as providing a comprehensive picture and training rules which can be applied generally. Industrial jobs are not all short cycle repetitive tasks nor are they all as neatly ordered in sequence of activities as the text of *Training Made Easier* might suggest. The reviewer's own experience as a training officer in the textile industry has been a succession of reminders that each training situation is unique and that specific factors in particular work situations call for the establishment of guiding principles which are peculiar to that class of activity and which are equally vital for success as the few general principles which may apply in training for all classes of industrial work.

Despite these criticisms *Training Made Easier* remains a most valuable addition to industrial training literature. One must conclude from its reading that learning and training can be made easier, but only if there is a readiness to undertake the hard work of preparation that thorough job analysis involves.

Mr S. D. M. KING writes:

Since the war, a considerable amount of careful research has been carried out, by means of controlled studies, on the problems of learning. These studies have led to some useful findings, which when correctly interpreted can improve the quality of training in the right organisational setting. The problem then arises how best to present and apply the findings. *Training Made Easier* is, as far as it goes, an excellent attempt to summarise and communicate, on paper, the results of four leading studies.

The booklet is divided into three sections. The first two are concerned with what trainees have to learn, and how they can be helped to learn. These communicate the major findings quite adequately in language which should be understood by any training manager whose qualifications really fit him for the position. They deal, for example, with symbolic and non-symbolic decisions, with the stages in learning and with factors affecting the speed and quality of performance.

A practical example of analysing an industrial job is included. This involves the use of the Sensorimotor Process Chart. Here the text is a little

more difficult to follow in relation to the chart and its symbols. Nevertheless, the chart itself provides an excellent illustration of the way in which research findings can provide a framework for practical application.

The third and last section is entitled 'Problems of Application'. This only covers two pages and scarcely mentions any problems of application. Yet the evidence from industry is that the finest training methods can lose almost all their effect because of incorrect application.

What are these problems? Perhaps the most frequent complaint from training staffs is that line managers do not accept the idea of training. Trainees who do well in training mysteriously reduce their performance on production. Sometimes when there is a shortage of labour, trainees are wrenched from their training course to go into production before they are ready. Such incidents dishearten the training staff and feed the notion that training is ineffective or that it is really a luxury. In the more severe cases whole training schemes, set up with infinite care, have been allowed to wither away within two or three years of their inception.

The problems of application raise questions of policy, organisation and the function of training within an organisation. What responsibility does line management have for training? What then is the role of the training manager? Who should assess the value of training? It is not of course the fault of the research workers that these questions are skimmed. Most of them know only too well that these problems exist but find themselves limited by their terms of reference.

It may well be useful therefore in this context to distinguish between what may be called 'closed system' research and 'open system' research. These studies are described as 'controlled' studies and their findings are dependent upon a reasonably closed system for their validity. When the techniques derived from these findings are introduced into the open system of a factory, they are subject to a great many external pressures and variations. For instance, the negative attitude of a production foreman towards training can have a detrimental effect on the motivation of trainees to learn their jobs which seriously negates the value of the best training methods.

In order to present the findings of new research to industry, perhaps what is needed is not only the use of attractive booklets in simple language — though these are a help — but more research in an industrial setting. What is lacking is a series of clinical studies which observe and record all the major problems of applying these methods in the actual setting of a living factory organisation. And while this booklet should be of considerable value to those concerned with improving training methods, it could perhaps have been more aptly entitled *Learning Made Easier*.

MISS E. M. GENTLES writes:

This is a very concise booklet on recent research studies into the nature of industrial skills. Busy personnel and training officers who could not be persuaded easily to read a text-book on the subject should find it very readable. Moreover, the excellent pen drawings by Margaret Wetherbee not

only break up the text for any reader who does find it heavy but are instructive as well.

For those who refuse to see beyond T.W.I. in all matters concerning operator training, the very true words of Mr St. John Wilson at the 1958 Ergonomics Research Society Conference in Bristol are quoted in the introduction: 'This is only a foundation upon which management can build, and those who have best succeeded with T.W.I. continue to use it as a foundation upon which to build a fuller and continuous programme of training'. A T.W.I. Job Breakdown, apart from not providing enough information, in many instances tends to stress only the 'visual' aspects of a manual task. *Training Made Easier*, in the first section, which is an attempt to answer the question, "What do trainees have to learn?", shows that there are 3 types of activity involved—sensory, mental, and physical—and that sensory activity involves the reception of information from the five familiar senses as well as the lesser recognised 'kinaesthetic' sense. Far too little attention is paid to this in operator training. Here, I should have liked an extra word said about 'learning by listening' as so much new automatic equipment is partly air operated, and involves the learner operator using his or her ears for cues far more than in the past. Some information too on the problems of patrolling and distribution of an operator's attention where more than one piece of plant is involved would have been interesting.

In the second section, which tries to answer the question, "How can trainees be helped to learn?", it is argued—and I agree—that the Sensorimotor Chart can help to highlight the most difficult parts of a task. The one example which I have seen in industry concerned the operation of a complicated electrical test which was simplified drastically by the engineers after study of one of those charts. The training of the operator, therefore, became a much simpler problem simultaneously. I rather think, however, that the average Training Officer would boggle at this chart as being rather difficult and cumbersome to prepare, and would prefer the easier Left Hand, Attention Points, Right Hand type. I was pleased to read in this second section the advice on 'Aids to Learning' when knowledge of results in terms of quality as well as quantity and the effect of competition are discussed. Lack of such knowledge in my opinion is often the reason why a learner becomes discouraged. I believe that Sir Frederic Bartlett once remarked, "It isn't practice which makes perfect, it is practice the results of which are known".

In the third section dealing with particular problems of application, it is made very clear, as many training officers have found to their cost, that setting up a sound training scheme is no easy task. Some good advice is offered. More might have been said, however, about the training of supervisors and instructors as so often the crux of the problem lies here, and as the E.P.A. survey showed, not much attention is given in industry to the training of trainers. I should have liked, also, some advice on the selection of operators, because in my opinion selection and training cannot be separated, and yet often training schemes are set up with little or no thought to this aspect.

Book Reviews

Group Dynamics. Edited by DORWIN CARTWRIGHT and ALVIN ZANDER. London: Tavistock Publications, 1961. 2nd Edition. Pp. xii + 826. Price 42s.

The first edition of this book appeared in 1953 and was enthusiastically received by this reviewer in these pages; it has been widely used as a source book on small groups since that time. The new edition can be recommended even more strongly, and is certainly the most useful single book on the subject available. As the editors say in their preface, more research has been done in this field since 1953 than before that time, so that there is need for a new edition. Out of the 35 papers in the first edition, 18 have been replaced, while retaining the same arrangement in six sections. This is a very interesting new selection, while the most important of the original chapters remain. In addition, the editors have contributed a history of small group research and a chapter on theory and method; they have rewritten their introductions to the six sections so that these now provide excellent surveys of research in the areas in question.

There is no disputing the tremendous contribution to the field which has been made by people who are at, or have been at, the University of Michigan—Festinger, Schachter, Newcomb, French, Katz, Lippitt, and the editors of this volume. Naturally this collection of papers draws heavily on the work of this group. The editors say that they decided not to include work on social perception and on the interactions between group variables and personality. They also include little on detailed studies of inter-action sequences—such as the work of Bales or the operant conditioning of verbal behaviour. These omissions are all in the areas where group behaviour is coming close to being explicable in terms of known principles of individual psychology. It would be nice if the third edition could include a section covering these areas of group research.

MICHAEL ARGYLE

Toward the Liberally Educated Executive. Edited by ROBERT A. GOLDWIN and CHARLES A. NELSON. New York: Mentor Books, 1960. Pp. 142. Price 4s.

It had to happen, I suppose. Over the past 15 years, American executives have been trained in the arts of joint consultation, human relations and communications; taught to write and speak effectively; and to read more quickly. That, it seems, is not enough. Now they are to be liberally educated. But this does not mean a radical overhaul of the American educational system, nor even of its vaunted way of life; it means courses for executives in Institutes of Humanistic Studies and Centres for Civic Education, or participation in Personal Development Programmes in the Liberal Arts.

This book aims to show that present day problems can only be tackled by men with 'big' minds; that such 'bigness' is best cultivated through liberal studies; and that every man should 'early in life acquire the habit of turning to the liberal studies that he may refresh himself and go on growing'. The book is printed on cheap paper (by contrast), and the names of the contributors, perhaps for good liberal reasons, are printed without capital letters, like this 'frederic e. pamp. jr.'. The liberal arts, it seems, should be studied because they are useful, and because, like golf, tiddleywinks or drink, they are meant to refresh us. But can we not study them for their own sake or for our own amusement, with no ulterior motive? And can we become 'liberally educated' after a short course in predigested culture?

Study of the book reveals that it consists of snippets, taken from books, articles, and lectures given by bigwigs from industry and education. Some snippets often read like parodies of bigwig big bow-wow: such as, "Would you think, for example, that a man was liberally educated who had not pondered deeply over such an idea as 'What's good for General Motors is good for the country.'" Others might serve as illustrations of managerial gobbledygook: for example, "Meanings on the widest possible level feed perception on a narrower one." Others, again, are merely frighten-

ing: for example, "The genius of the corporation is that it provides a medium by which the savings of the many may safely and effectively be put to work voluntarily under the management of the few." Quis custodet ipsos custodes?—a tag whose meaning is, I hope, included in some of the courses.

Considerable claims are made for the value of these courses. For example, some American executives 'have taken to buying books'. One even remarked "When my brother in law recently gave his daughter a red Buick convertible for a graduation present, my wife and I thought how a trip abroad would have been a much more lasting gift. A year ago we would have taken the convertible for granted."

Much of this book would be a riot, if it were not so sad—sad, because of the terrible earnestness with which the subject is approached; sadder because the whole point of liberal education seems to have been lost in a sludge of good intentions; saddest because, to the contributors, the main value of a liberal education is that it turns executives into 'more productive members of the company's management team'.

"One of the great objects of education", wrote Sydney Smith, "is to accustom a young man *gradually* to become his own master." Nowadays we might substitute 'inner-directed' for being one's own master; certainly, some of the contributors to this book accept and use David Riesman's terms, while *The Organisation Man* is compulsory reading at some of the colleges mentioned. There is, it seems, a shortage in what are called 'the lower echelons', both of 'innovating, self reliant business leaders' and of 'purveyors of economic progress' (and what are they, one may well ask?). As it is a bigwig who says that, we are presumably to assume that these paragons are to be found at least in top management. But who, after all, is responsible for creating these 'other-directed' organisation men, if not top management, whose trite commonplaces ("Give us *educated* men. We can *train* them ourselves. But we cannot *educate* them.") abound in chapter after chapter?

In fact it is hard to resist the conclusion that this whole book is masterpiece of double-think. The high priests of conformity urge the value of liberal education! It would be going too far to suggest that they had decided to destroy liberal values by the simple expedient of proclaiming how wonderful they are; but there certainly seems to be a contradiction in their thinking.

This is revealed particularly in the book lists, used at the various institutions, which are printed as an appendix. Here, Homer, Plato and Aristotle rub shoulders with Macchiavelli and Shakespeare, with Aldous Huxley, Ernest Hemingway and Arthur Miller. A liberal education, it seems, is learning a little about the 'best' books. Strangely enough, the one unifying theme behind liberal civilization, indeed behind western culture as a whole, is barely touched on; there is no attempt to raise the underlying religious and moral questions in a Christian context; no effort to see what modern and ancient theologians have said about man, ethics, and society. As I read page after turgid page, I was reminded of John Betjeman: "Before a talk on sex and civics, I meditated on the Fall."

T. M. HIGHAM

The British Journal of Criminology (Delinquency and Deviant Social Behaviour). Vol. 1, Nos. 1-4, 1960-61. Published by Stevens on behalf of the Institute for the Study and Treatment of Delinquency. 42s. a volume.

What is criminology? Perhaps we may find an answer by asking, who are criminologists? If the contributors to this part-new *Journal* give a dependable index, the answer would be: Psychologists .500: Sociologists, Prison Medical Officers, Administrators and Architects .325: and Psychiatrists, Psychiatric Social Workers, Magistrates and Probation Officers .175. Not, one must add, in loadings on the general factor, but in proportions. But our question is rather a pseudo-question, for the *Journal* turns out to be the ten-year-old *British Journal of Delinquency*, changed in name, publisher and printer but happily unchanged in its catholic editorial policy.

The variety of papers is thus wide, as befits a study in process of finding its methodological feet. The fourth number is taken up with contributions, effectively illustrated,

on prison architecture; other numbers include a psychiatric case-report, a symposium on "Assessing the Offender for the Courts" and a discussion of criminal responsibility. That there are several reports of surveys demonstrates the field's need to identify relevant variables and dimensions. This quest for structure and principles of classification finds one interesting guide in Marcus's factor-analytic study of a prison population, which points to dimensions of general social maladjustment, disposition, and—possibly—"ease of institutionalisation" (occupational psychologists might note that 'poor work record' has one of the highest loadings on the first of these and is negatively correlated with 'solitary disposition' and homosexuality). Not the least valuable features of the *Journal* are its reviews and a regular *Current Survey* of research and developments: nowhere else in this field is there easily accessible a comprehensive summary of research-in-progress.

Finally, appearance and bearing. The new binding, paper and type-face promote the *Journal* from a shaky C minus to a high B; an A is withheld only because of a trace of meretriciousness about the cover design.

JOHN H. F. CASTELL

Communication or Conflict. Conferences: their Nature, Dynamics and Planning. Edited by MARY CAPE. London: Tavistock Publications, 1960. Pp. xi + 228. Price 30s.

This book consists, in the main, of an edited version of discussions at a Conference about Conferences which took place in Eastbourne in the winter of 1956. The enterprise was a joint affair between the World Federation for Mental Health and the Josiah Macy Jr. Federation of New York, which financed the meeting. There were twenty-one participants, including four or five representing the sponsoring organisations, under the chairmanship of Dr Brock Chisolm.

The text opens with a Foreword by Dr J. R. Rees, a Preface by the Chairman and an Introduction by the Editor. These are followed by the inevitable contribution from Dr Margaret Mead on 'The Cultural Perspective', a documented essay by Professor Otto Klineberg on 'The Appreciation of Individual Idiosyncrasies', and a short sketch by Dr T. A. Ratcliffe on 'The Historical Development of Group Work'. The discussions are sub-divided according to the following topics: (i) aims, planning and organization; (ii) group atmosphere, agenda, manipulation; (iii) steering committee and leadership; and (iv) communication, evaluation, training and research. Finally, there are five appendices: the first one lists a series of questions for sponsors of conferences, the second is a clear and factual description of inter-country World Health Organization conferences and allied activities, the third sketches an American Quaker scheme which arranges conferences for selected diplomats, a fourth gives a report of a Washington Conference on Interpretation, and lastly, there is an account of the Macy Foundation Conference Plan.

There may possibly be some readers who will find this book useful, but the present reviewer cannot help wondering whether its publication is justified. Like hundreds of thousands, or millions, of other people, the participants have attended conferences in the past, but few if any could claim to be 'experts' in this subject, if, indeed, such 'experts' can be said to exist at all. And the Macy Foundation method of recording everything, or virtually everything, that is said at a conference may intrigue those who took part, but, at any rate in the present instance, it scarcely leads to material worthy of perpetuation in book form. 'Set a thief to catch a thief' may be a pearl of folk wisdom for criminologists, but its analogue, a Conference about Conferences, is not necessarily the correct scientific approach to the study of 'Conferenciana'.

Nevertheless, the book is not entirely worthless. It is, to some extent, redeemed by an occasional wise remark from the Chairman and Professor Hutte. There is a valiant insistence by Professor Klineberg that the success of conferences is not measured by how happy the participants feel at the end, but by some after-effect in the outside world, and Dr Kenneth Soddy's sober and down-to-earth remarks bring an air of reality to the proceedings.

In a way, one feels there is something pathetic about this publication. The sponsors were patently anxious to do good, for the benefit of the world and (why not?) for their respective organizations, but they were not quite sure how to set about it. They accordingly decided to hold a Conference, in the sanguine belief that, from the oracular utterances of their friends, the golden truth would spontaneously shine forth. Unfortunately for such a naive assumption, nothing of the kind happened. Apart from one or two essays and appendices prepared in advance and the exceptions noted above, the record of the discussions is largely a dead letter. A competent secretary could have reduced what is of value in it to one or two pages.

One interesting outcome, however, no doubt unintended by the sponsors, is that the reader is able to make a numerical analysis of the discussions. The number of interventions by participants ranged from 6 to 70, with an average of about 30. Their total verbal contribution, as measured by the number of lines of print devoted to their interventions, ranged from 33 to 538 lines, with a mean of 200; and the mean lines per intervention was about 6, the range extending from 3 to 9 lines. There was a tendency for those who intervened more frequently to speak at greater length. It might be worth while enquiring whether this is a general feature of those who take part in Conferences.

The data are tabulated below.

Participant	Number of interventions	Total lines	Mean number of lines per intervention
1	33	161	
2	39	221	4.9
3	41	189	5.7
4	46	258	4.7
5	13	77	5.6
6	63	538	5.9
7	52	407	8.5
8	29	130	7.8
9	47	353	4.5
10	13	68	7.5
11	20	186	5.2
12	13	38	9.3
13	21	137	2.9
14	12	98	6.5
15	47	368	8.2
16	28	169	7.8
17	70	484	6.0
18	12	56	6.9
19	6	39	4.7
20	11	33	6.5
			3.0

JOHN COHEN

Les Mécanismes Perceptifs. By JEAN PIAGET. Paris: Presses Universitaires de France, 1961. Pp. 457. Price N.F.28.

This latest volume from the pen of Professor Piaget is an attempt to present a synthesis of studies of perceptual development carried out under his direction during the past fifteen years at Geneva. Much of this work has already been described in detailed experimental reports which have appeared in the *Archives de Psychologie*, as well as in his earlier works, such as *The Psychology of Intelligence*, but a number of experiments are here reported for the first time.

The author's aim is two-fold: practical and theoretical. There are practical advantages in bringing together in one book the principal results of some forty or fifty specialist articles. More important perhaps is the opportunity taken by Professor Piaget

to give a sketch of the general point of view which has informed and guided these researches. His theoretical position is adumbrated in Part III, to which the reader is advised to turn before immersing himself in the details of Parts I and II.

Two kinds of theoretical problem are considered. The first is the relationship between perception and intelligence, a question which presents itself sharply in studying the pre-operational thought of the young infant. This first problem poses two subsidiary ones: (a) are concepts abstracted from perception or do they have a non-perceptual origin? and (b) are any analogies justifiable in comparing and contrasting perception and intelligence? The second general problem relates to the epistemological value of *perceptual* as compared with other forms of knowledge.

Part I is largely concerned with the study of so-called 'primary effects' in the form of primary illusions and relative 'centrations'. It is worthy of note that Piaget's point of departure here appears to have been an observation long ago made by Binet, namely, that certain illusions increase, and others decrease, with age. Part II is taken up with a discussion of perceptual *activities*, in particular, 'secondary' illusions, the constancies, perceptual causality and the perception of movement, speed and time. In Part III, Piaget turns to the fundamental task of elucidating the 'structures' of perception and intelligence, the origin of concepts and operations, and finally, he considers the epistemological conclusions prompted by the foregoing.

The fundamental differences between perception and intelligence turn out to be, according to Piaget, first, those which pertain to the relations between subject and object and, second, those which are relative to structures or forms as such. Perception is subordinate to the presence of the object ('stimulus bound', one might say) of which it furnishes a direct knowledge. By contrast, intelligence can evoke the object in its absence by a symbolic method (imagery, words, etc.); and even in the presence of the object, it is not 'stimulus bound'. Perception is essentially egocentric, whereas the operations of intelligence are, so to speak, independent of the self, in the sense that they can be potentially rendered 'universal'. Perception, he concludes, has a double nature. It is the source of systematic errors, on the one hand, and reflects intelligence while indirectly prefiguring it, on the other.

Piaget's unique place in contemporary psychology and his extraordinary contributions to the subject are here, once again, made evident for all to see. Perhaps the principal lesson which the occupational psychologist will learn from this book is to realize the great complexity of developmental processes in perception and intelligence, a complexity which, thanks largely to Piaget, now seems orderly rather than chaotic.

No occupational psychologist who makes a serious study of this new work of Piaget will look at 'tests' with the same eyes as before, and very likely he will abandon them altogether or, at any rate, treat them with considerable scepticism. For the upshot of Piaget's efforts is to demonstrate beyond doubt that we are barely at the beginning of the alphabet in the study of the microstructure of perception and intelligence, whereas so-called standardized tests assume not only that there is no problem of microstructure but that the macrostructure can be determined without adequate theoretical analysis.

It is to be regretted that the book has no Index, a defect which should be remedied in subsequent editions as well as in the English translation which, we hope, will be forthcoming in the not too distant future.

JOHN COHEN

Les Attitudes. By H. J. DUIJKER, P. FRAISSE, R. MEILI, P. OLERON and J. PAILLARD. Symposium de L'Association de Psychologie Scientifique de Langue Francaise. Paris: Presses Universitaires de France, 1959. Price N.F.10.

This book is a report of the 1959 meeting of the Association de Psychologie Scientifique de Langue Francaise, held in Bordeaux; it is the sixth symposium of this very active group, whose previous symposia dealt with the nervous system, perception, child development, conditioning and learning, and motivation. The five main speakers were joined by a number of others, and almost a third of the book is given over to the discussion which took place.

The present symposium deals with the concept of attitudes, as reflected in a number of different fields (perception, cognition, emotion, inter-personal relations, motor movement). The matter is, therefore, much less clear-cut than on previous occasions, and it is small wonder that the speakers frequently get caught on the horns of the numerous semantic dilemmas with which discussions of attitudes usually bristle. (I remember, in going through definitions of 'attitudes' in connection with writing *The Psychology of Politics*, that I got up to about eighty entirely different notions before deciding that this was not getting anybody anywhere.) The discussion in this book is very learned, often going back to the original German concepts underlying the French and Anglo-American usage of the term 'attitude'. But it cannot be said that the discussion justifies putting together so many different experimental contents under one term—particularly as the most accepted use of the term, namely, social attitudes, is not discussed at all. It would have been interesting had the symposiasts tried the intriguing task of relating their various notions of 'attitude' to that of 'habit', in the sense that this term is used by modern learning theorists; I would imagine that whatever common content there may be, this is in fact mediated by the notion of SHR. There are one or two attempts to approach the problem from this point of view, but none of them is persisted in.

It is doubtful if this book will be read widely in this country, and it does not suggest any kind of creative synthesis. It does, however, suggest that meetings of scientific bodies, such as the British Psychological Society, might perhaps, with some hope of success, be devoted in a similar manner to a much more thorough explanation of a single concept by a fairly large number of eminent experts; the Bordeaux Symposium sounds as if it has been fun for those who took part in it.

H. J. EYSENCK

Learning, Remembering and Knowing. By PATRICK MEREDITH. London: English Universities Press, 1961. Pp. 174. Price 6s.

The stated aim of this book is "to show the solitary student what his job is", or to help him "to understand his understanding". By the 'solitary student' Professor Meredith appears to be referring to the readers of the *Teach Yourself* books (to which series this volume is the latest addition). However, the approach and principles advocated in the book would appear to be good advice to a much wider public.

One of its cardinal features is the emphasis placed on the individual's responsibility for his own 'mental growth', of which the three activities denoted in the title, learning, remembering and knowing, are seen as aspects. In trying to get this thesis over to a non-psychologist public the author utilises a concept of mind based on a notion of the schema. "Mind", he suggests, is the totality of "economical abstractions from experience" (the 'schemas') "made partly by the individual and partly by the race" (the latter being acquired by the individual through the medium of language). They form an inner model of the outside world, a working model through which all interpretation of the outside world and all action in it is effected. This system is, in Professor Meredith's opinion, constantly striving toward an organisation of the world which is meaningful.

Mental, or rather intellectual, growth is, in this framework, the reorganisation of old schemas to give new. Intellectual growth occurs by learning, in which the structure of a new area of knowledge is abstracted, a new schema is formed, and new understanding gained; by remembering, in which the schema is established through (for example) translation into new terms, hence reinforcing the abstraction; and by knowing, in which the schemas or abstractions are used to guide action. All of these activities, the author claims, can be learned by the individual, and if he is to acquire knowledge effectively he must "learn how to learn, learn how to remember and learn how to know". The author suggests that these skills are all matters of organisation or strategy. To acquire knowledge one must actively organise. "The textbook merely provides the materials and clues for understanding, but understanding does not come automatically." The solitary student must employ a strategy to sort out the clues for understanding

and retention of knowledge. Professor Meredith suggests that sorting out the "key" words in a textbook, constructing diagrams, or devising tables graphs or schematic drawings, give valuable help in sorting out the clues and demonstrating their significance. The graphic representation of the structure of an area of knowledge, showing the "pathways between facts", is maintained as an aid to the establishment of the schema, the inner representation. In general reading must be interpretative, involving an active process of relating old knowledge to new; the reader should, the author maintains, attempt to reveal analogies between existent schemas and those which he is striving to acquire. This attempt has the double value of strengthening both the old and the new schemas. There is, Professor Meredith maintains, a manifest-latent content distinction in the textbook. The manifest content is "the sum-total of explicit propositions", and the latent "the sum-total of schemas . . . implicit in those propositions". These latter must be coaxed from the mind of the reader by the reader himself, these being the schemas necessary for understanding. Books are seen as stimuli which "stir up the schemas already there, schemas which are then modified and grouped in new patterns, i.e. new schemas", representing new understanding. Books, the author remarks, are the "catalysts of brain action".

The emphasis on the active role of the individual in his acquisition of knowledge would appear to be one of the main points in favour of this book. That the pursuit of knowledge is not a passive business could be a useful axiom for university undergraduates and other supervised mature learners, as well as for those individuals who attempt to extend their knowledge by means of the *Teach Yourself* series. It would seem unfortunate that this point is not adequately considered by most learning theorists. Many of the usual hints for students, on whole as against part learning, for example, are included in this book, but these are seen in a new light in reference to the overall stress on organisation by the individual. Rote learning is devaluated in favour of the translation of knowledge into new terms or its application in problem solution. This notion, of the change in the form which 'practice' must take to be of maximum value, is repeated several times. Nevertheless, it seems possible that the learner, acting on the principles put forward in this book, may tend to run before he can walk through not assimilating the basic concepts of his subject before trying to work with the higher-level concepts. A little more emphasis on the values of 'practice' would appear to have been desirable.

The book is on the whole well and clearly written. There is liberal use of analogy, one or two instances of which, for example the 'library' analogy in Chapter 9, appear to be a little tortured. However the majority are of the type which would greatly assist the non-psychologist in the understanding of Professor Meredith's thesis. The style of writing is bright, sometimes verging on the facetious, but likely to instil enthusiasm for his task in the solitary student. It may be suggested that this book will be useful to anyone new to solitary learning who is of average intelligence and who is reasonably well motivated to acquire knowledge. The presentation and typography are good, making for easy reading. Two typographical errors were noted.

C. C. KIERNAN

L'Adolescent en Apprentissage. By JEAN ROUSSELET. Paris: Presses Universitaires de France, 1961. Pp. 145. Price N.F.6.

Works-based apprenticeship in France is conducted under two different schemes: *apprentissage artisanal*, with training on the job, and apprenticeship in large enterprises, with training in works schools; since the last war, there have been also the *Centres d'Apprentissage*, Government-run colleges for full-time training. The duration of apprenticeship in France is three years.

Against this background, Dr Rousselet writes as a clinical psychologist; the book is presumably meant for the doctors and psychotechnicians who are attached to the French apprenticeship schemes and do vocational guidance work. The author is concerned with the difficulties inherent in adolescence, and he examines how these problems are met under vocational training of different types. However, he groups

apprenticeship in large undertakings together with *Centres d'Apprentissage* and similar private colleges; the other category is artisan apprenticeship.

The ensuing comparison is not strictly between forms of training, for artisan apprentices are handicapped through their home life (poverty, broken families, parental prejudice, ignorance and indifference) and their mediocre performance at school. The abrupt transition from school to artisan apprenticeship is found to be a traumatic experience, since most of these boys (and girls) are used as cheap labour, receive scanty training, and are made the butt of older workers.

On all these counts, the other forms of training, grouped together by the author, are commended by him. It is a pity that he does not go on to compare the respective merits of apprenticeship in large enterprises and the *Centres d'Apprentissage*. Is it perhaps significant that the Centres have now been renamed *Collèges d'Enseignement Technique*, so that the term 'apprenticeship' disappears?

All apprentices in the de-skilled trades are liable to suffer from the disadvantages of mechanisation—narrowly specialised routine work lacking in interest and responsibility. Looking for a remedy, the author rejects the idea of giving all young workers 'identical' training and technical education; but he does not consider the possibility of different levels of training and education, appropriate to the various levels of skill, which would make them adaptable to technical changes. Dr Rousselet accepts as inevitable that a great part of the workers are denied self-realisation and maturity in their work. He recommends that lower-grade apprentices and non-apprentices should be helped to lead fuller lives by developing their personality and their interest in leisure activities. One can wholeheartedly agree with this recommendation.

K. LIEPMANN

Chance, Skill, and Luck. By JOHN COHEN. London: Penguin Books, 1960. Pp. 201. Price 3s. 6d.

Professor Cohen has written an interesting book with the sub-title "The Psychology of Guessing and Gambling". (I suppose it is too much to hope for a companion volume sub-titled "The Guessing and Gambling of Psychology.") All of it should interest the psychologist. With the possible exception of the first two chapters—an introduction and a discussion of psychological probability—I would expect it also to interest a much wider circle. Since it has merited paper-back publication I am presumably not alone in this judgment. Besides I have for evidence the fact that my son, who has no interest in psychology, had bought it before I received the review copy. But do not be put off by the paper back and anticipated popularity. This is fascinating stuff and a very real and useful attempt to explore a facet of human behaviour which has had far too little attention.

Two chapters describe a series of ingenious but simple experiments concerned with the combination of skill and chance. The book goes on to review the scope of belief in luck. There follows an examination of the effect of alcohol on risk-taking and hazard and an essay on guessing at the meaning of precise speech, all with nice simple experimental evidence interspersed.

Because the subject is large and the author is covering parts only of a wide field the book appeared to me, reading it straight through, as being disjointed. Each chapter could stand in its own right as a journal article. This is accentuated by Professor Cohen's ability and proclaimed aim to draw from a wide universe. For my own part I find it unnerving to have to switch within a few pages from Babylonian divination by entrails to guessing games in a Manchester school. I find the gambling habits of ancient Persia or Peru of less interest but I love the figures. I am prepared to accept without surprise the beliefs of the Sumerians and Akkadians in the third millennium B.C. but I am vastly intrigued to find that in spite of universal education more people prefer 7 chances of a 99 to 1 gamble to 1 chance of a 9 to 1 gamble; or that on the other hand those who prefer a 9 to 1 chance may prefer it to as many as 50 tries at the 99 to 1 chance. Psychological probability is clearly very different from mathematical probability.

The treatment of risk taking is perforce less satisfactory since it deals experimentally

only with situations in which there is no real risk or at best a negative risk—that one will fail to win a prize. Perhaps Professor Cohen's versatile mind will enable him to explore further. Already his experiments pose some pretty problems. Why did 10 times as many 9 year old children prefer one chance in 25 of winning 25 packets of sweets as preferred *certainly* of winning one packet. Is this an inherent pleasure in risk taking or merely greed? One may accept with due horror that 80% of the 'bus drivers who had enjoyed six whiskies should imagine themselves capable of driving an 8' wide bus through a gap less than 8' in width, but what perverse sense of self-esteem or competitive spirit produces a figure among skilled and sober 'bus drivers as high as 68% with the same unfortunate delusion? Beyond this there is wonderful vista of speculation. Suppose we could train or educate people not to take such risks, should we do so? We might reduce the rate of accidents but what would happen to the savings in premium bonds and where would our heroes come from?

Interesting? Do not laugh at me those of you who dislike even simple figures. This is interesting to the point of being a bedside book (dip into it where you will) apart from being worth serious study.

M. H. BROLLY

Glasgow Limited. By T. T. PATERSON. Cambridge University Press, 1960. Pp. x + 243. Price 30s.

Most books on, or about, management, fall into one of three classes — the prescriptive, the encyclopaedic, or the analytical. The first is usually full of advice, often the distillation, in cliché form, of some tycoon's accumulated experience. The second lists the policies and practices of as many firms as possible, like a cookery book. The third is most often an account of 'the principles of organisation' which are first stated and then shown in operation. Just occasionally, a book is published in which the author describes some particular event, and then goes on to draw tentative conclusions of more general value from them. Cantril's *The psychology of social movements* is one such book. Leighton's *The governing of men* is another. In this country, Elliott Jaques's *The changing culture of a factory* and Wilfred Brown's *Explorations in management* come to mind. Books of this kind are all too rare. It is one of Dr Paterson's great merits that he has produced two of them.

His first book, *Morale in war and work* (London: Max Parish, 1955. 18s.) was an account of the low morale and high accident rate at an R.A.F. station; the analysis of the situation, the treatment of it, and the account of the theories derived from the experiment made it one of the most interesting books of its kind in the 1950s. Dr Paterson's new book *Glasgow Limited* has the same approach. This time it is about a small engineering firm in Glasgow and covers a period of 5 years; again, the situation is described and analysed; while the theories put forward in the earlier book are re-tested, and others developed.

Since 1955, when *Morale in war and work* was published, there have been some ('a discerning few' they might be called) who have hoped for a further account of these theories. Some have been able to apply them in their own jobs, others found they clarified points which had previously bothered them. From Dr Paterson's occasional articles, or broadcasts, they were able to glimpse something of what was coming. In *Glasgow Limited* they will not be disappointed, but they may well ask for more. It is perhaps a criticism of his method that he leaves some ends untied, and makes passing reference to later researches or other work; but this Zeigarnik approach, one hopes, will only stimulate the appetite.

Glasgow Limited is about a factory employing nearly 300 men and women, mainly from the Bridgeton district of Glasgow. It is, says Dr Paterson, in his preface, 'a story of men working alongside each other, not together but wanting to be so, yet unable to find a way'. The book describes how after years of strikes, go slows, low productivity and absenteeism, there was 'a fairly sudden change to a state of peace, of production increased by over 80%, of health and happiness of men'.

The study of this firm came about because a former student of Dr Paterson's brought it to the latter's notice; two of the managers also happened to have been his students, and because of these connections he was able to 'gain entry'. He was able to refer both to the firm's files and to those of the trade union concerned; and those, together with verbally reported statements and face-to-face conversations, with the people involved, provided him with all the background information he needed. His historical account of the firm was tried out on the works manager, the union organiser and one of the men involved, and was agreed to be a full and fair summary of a disturbed and, at times, controversial story.

The book is in four parts. The first gives an outline of the belief-system of the Bridgeton district. It is short and compact, and a good example of social anthropological research. Part II is the historical section mentioned above, which traces the history of the firm from 1946 until 1950. Part III is statistical, and concerned with the relationship between productivity, labour turnover, accidents, and health. Part IV is analytical, and examines the concepts developed elsewhere by Dr Paterson, and suggests other lines of thought arising from the present study; it concludes with a chapter called 'Of morals and industrialism', which is in some ways the upshot of the whole book. It points, I hope, towards a further development of his ideas in later publications.

Dr Paterson's style is taut, crisp and compact; few words are wasted. This makes for tough reading: at times, more explanation is needed (this could be said of his graphs, in particular), and some passages need to be read twice to get the drift of his rapid thought processes. This is hardly a criticism; there are few books in this field which really force one to think. Moreover, Dr Paterson always defines his terms, and is careful in the way he uses them. For example, on page 113, he defines the difference between efficiency and performance in a way which, while it may irritate work study engineers or economists, helps to explain figures and phenomena other than the ones he quotes, in a way which the one or the other specialist rarely can. This precise use of defined terms is badly needed.

There are many flashes of acute observation, often in the many footnotes throughout the book. Many prompt thought, or suggest points to investigate. Take for example the footnote on page 199: "Hence in the U.S.A. one finds the apparent paradox of the 'freedom of the individual' with excessive conformity to group standards; whereas Britain's 'team spirit' is applauded and tolerance of eccentricity is a cultural trait. In U.S.A. there is competition and conformity; in Britain there is cooperation and individuality."

There is also (on page 61) one of the now celebrated four letter words, appearing in full, and surely for the first time under the august imprint of the Cambridge University Press.

One might call this book a study of social and economic factors at work in their relation to other observable and measurable factors. The rates of accidents and labour turnover, of spoilage, sickness and productivity show how closely these are related to each other and to the whole social climate at Glasgow Limited. Work is shown to be a function in life, and not merely something done to earn money—a fact well enough known to psychologists, but not perhaps to all economists.

But social life implies morality, and it is in his examination of 'fairness' and 'goodness' that Dr Paterson has made his greatest contribution in this book; his thinking here derives partly from G. E. Moore, partly, I suspect from F. H. Bradley—two uneasy bedfellows in an industrial setting, one might have supposed. But such an examination has long been needed; most if not all the problems facing managers are ultimately moral ones, whether they like it or not—problems of incentives, discipline, welfare or even overtime; Paterson's ethic is neither woolly nor idealistic, but practical and immediate: rightness and goodness are seen in terms of the enterprise as a whole, its goal and its purpose, and as linked with the systems of authority which arise from the relations between its members. From it emerges a managerial philosophy; one that I hope he will expand in a further book.

Much of that philosophy, in its study of authority and moral imperatives, illuminates that chimeric term 'communication'. His study of the part played by moral and personal authority in enhancing or reducing a man's structural (*i.e.* line) or sapiential (*i.e.* functional) authority, shows particularly well that communication will not take place where mutual trust is lacking. His account of the social roles in the smaller working groups provides a practical illustration of the truth of Professor C. A. Mace's contention that effective communication need not be diffuse, but should be concentrated on those most likely to put it to good use.

Taken all round, this is an exciting book. Industrial psychologists will profit from it; but it should also be read by personnel and other industrial managers. It will stimulate them to think, even if they do not always agree, and it can, as I know from experience, help them in their day to day work. Dr Paterson's earlier book was one of the most influential of the last decade. This book will help to form the managerial philosophy of the present one.

T. M. HIGHAM

Inside a Sensitivity Training Group. By IRVING R. WECHSLER and JEROME REISEL. Monograph Series: 4. Los Angeles: Institute of Industrial Relations, University of California, 1959. Pp. 133. No price given.

There is a sense in which Jack Kerouac's Beat Generation, our own Angry Young Men and Existentialism link up with the twentieth century movement in psychology towards free association, democratic leadership, 'verstehen' and a client-centred unstructured approach to people. Authority has been replaced by permissiveness and this change in method has uncovered a whole new world of hidden feelings and unsuspected motives. Much that has welled up from deep down has come as a shock. This has led to theories which have kept the new material in some form of control. A considerable vocabulary has arisen and the reviewer suspects that each new movement has felt a need to invent words as a way of coming to terms with the discoveries that have cascaded up from below. Beat has been defined as being 'at the bottom of your personality looking up'. Most psychological methods prefer to stand on top, looking down. The beat generation is 'determined to pursue experience to its furthest reaches . . . by throwing off all masks and entering into the inescapable truth and squalor of its own being'.

Sensitivity training stands almost in the middle between the extremes of either digging up feelings from the bottom of a pit or using telescopes to peer down on them from a safe distance on top. Sensitivity training tries to help the participants 'feel differently—and not merely *think* differently about the human relations problems which they are likely to face'. The trainer is expected to provide the appropriate setting for a digging session and encourages participants to 'uncover their feelings'. The word 'dig', by the way, is extensively used in Beat literature as a way of 'penetrating' into experiences or as a modern three-letter substitute for James Joyce's unprintable four-letter word. The trainer himself usually does very little digging. He uses the lenses of a telescope to interpret the feelings of the group around him. 'Group dynamics' is the more usual and more forbidding name given to the methods described in this 130-page booklet; these methods have had only a limited response in this country, but are still very widely used in the United States as part of 'human relations' training programmes. On this side of the Atlantic—ever since Nelson—there has been a tendency to prefer telescopes to spades.

Inside a Sensitivity Training Group honestly and briefly describes the group development of eighteen young men and six somewhat older women. There were thirty training sessions as part of a course on leadership principles and practice in the University of California's School of Business Administration. Each session is described in the form of a diary. Reading through it, one begins to get a real feeling for the method and people in it. There is some attempt at quantifying the events by scoring sensitivity, flexibility, volume of thought units, emotionality and satisfaction. The authors admit that these scores are not, as yet, very helpful although they show up some interesting

relationships between individual scores. By plotting some of these scores over the thirty training sessions it is possible to see that 'emotionality' goes up while 'satisfaction' remains on an even keel; the percentage volume of thought units per day shows no meaningful variation over the thirty training sessions. The results are inconclusive but in no way invalidate the basic assumptions which underly this kind of training. The main assumption is that 'as participants gain understanding of themselves, of others, and of various social pressures generated by human relationships, it is hoped that they will become able to function more productively in face-to-face and in group situations'. A considerable amount of modern training besides group dynamics, *i.e.*, most human relations teaching, also makes the assumption that 'insight' is likely to be 'productive'. It is surprising that this assumption has been so rarely investigated and almost never challenged.

As it becomes more and more doubtful whether a large measure of 'insight' can be produced in the limited amount of time usually available outside therapeutic work, so it becomes more urgent to ask ourselves whether this personal skill is equally useful or useless in different social and work situations. The idea that high morale leads to more output is already known to be untrue in some circumstances, but similar doubts have not yet been voiced about 'insight'. For instance, one would expect insight to be related to the function and structure of the organisation within which it is expected to have effect. The structure of one organisation may require a relatively small investment in psychological skill while another type of organisation will require a considerable amount.

The book makes a useful contribution to the literature because the diaries give one a measure of feeling about a method of training which is designed to make people 'feel' as well as think.

FRANK A. HELLER

The Anatomy of Judgment. An investigation into the processes of perception and reasoning. By M. L. JOHNSON ABERCROMBIE. London: Hutchinson, 1960. Pp. 156. Price 25s.

Psychologists are aware that subjective factors affect judgment. Whether or not a knowledge of these factors can result in better judgment is a moot point: some principles are not easily put into practice. There is evidence that principles are more likely to be put into practice by a person if (a) he has the impression that he has arrived at the principles through his own reasoning; and (b) he has been emotionally jolted during the process, as in religious or political conversion, or during psychotherapy.

This book reports an extended experiment in which these two factors were at work. The subjects of the experiment were Anatomy students, and the technique used was 'free group discussion'. The groups discussed topics of interest to anatomists—the description of radiographs, the uses of words like 'normal' and 'classification', and the evaluation of published experiments—but the atmosphere and conduct of the group approached those found in group therapy.

The first half of the book is an exposition of factors affecting judgment, and is centred on various demonstrations to which the students were exposed: illusions, the demonstrations of the Transactionalists, and the effects of set, emotion and socialization. These are all expounded in terms of 'schemata', a concept which is loosely used, but which helps in integrating the material.

The second part of the book is a report of the group discussions. Some of these are given verbatim, and Mrs Abercrombie uses them with great skill to show how the technique of free discussion worked. The chapter on the use of the word 'normal' would by itself justify the buying of the book. The effects of the discussions were studied, and evidence is presented (but not in enough detail for the reader to make his own judgment) showing that students who had passed through the course were subsequently more objective in their judgments.

Despite this, one is left with the impression that constant vigilance and great insight are needed for one to make adequate allowance for the subjective factors affecting one's own judgment. Mrs Abercrombie points out the dangers of reasoning by analogy,

yet she herself makes great use of analogy when discussing the implications of visual illusions. For instance, she found that students' attitudes to journal articles differed when the articles were read in the common room or in the class-room. She says, "Their attitude depended on their geographical position at the moment. This factor is comparable with the relative positions of the two shapes which affect our estimate of their size"—a reference to the Jastrow illusion.

However, the book is wise, beautifully written, and makes fascinating reading. It could be read profitably by laymen, for instance in adult education classes; it can be recommended to all undergraduates (it would be fascinating to see its impact on an English Literature class); and among psychologists it will be of particular use to those interested in education, group therapy, semantic therapy and cognition. The author gives enough information about her methods for the reader to repeat the experiments.

B. M. FOSS

Other Books Received

The following books have been received. Their inclusion in this list does not preclude their review later.

Psychological Testing. By ANNE ANASTASI. New York: The Macmillan Company, 1961. 2nd Edition. Pp. vii + 657. Price 52s. 6d.

Efficiency and Effort. By W. BALDAMUS. London: Tavistock Publications, 1961. Pp. viii + 139. Price 18s.

Zur Geschichte der angewandten psychologie in der Schweiz. By FRANZISKA BAUMGARTEN. Münsingen. B. Fischer, 1961. Pp. 108.

The British Association: Granada Guildhall Lectures, 1960. By GEORGE W. BEADLE, H. J. EYSENCK and LORD ADRIAN. London: University of London Press, 1961. Pp. 105. Price 4s. 6d.

Personality Assessment and Diagnosis. By EDWARD BENNETT. New York: The Ronald Press Company, 1961. Pp. viii + 287. Price \$8.00.

The Future of Occupational Health Services. THE BRITISH MEDICAL ASSOCIATION. London: British Medical Association, 1961. Pp. 16.

Freud and the Post-Freudians. By J. A. C. BROWN. London: Penguin Books Ltd., 1961. Pp. viii + 225. Price 3s. 6d.

The Meaning and Measurement of Neuroticism and Anxiety. By RAYMOND B. CATTELL and IVAN H. SCHEIER. New York: Ronald Press Co., 1961. Pp. viii + 535. Price \$12.00.

Social Factors in Economic Development. By T. R. FILLOL. Cambridge: Massachusetts Institute of Technology, 1961. Pp. x + 118. Price \$3.75.

The Just Wage. By MICHAEL FOGARTY. London: Geoffrey Chapman Ltd., 1961. Pp. 309. Price 30s.

Persuasion and Healing. By JEROME D. FRANK. Baltimore: John Hopkins Press. (London: Oxford University Press), 1961. Pp. xiv + 282. Price 35s.

The Chosen Few. By W. D. FURNEAUX. Oxford University Press, 1961. (Published for the Nuffield Foundation). Pp. xxvi + 245. Price 25s.

The Selection and Development of Management. By ROBERT D. GRAY. Pasadena: California Institute of Technology, 1961. Pp. 11.

An Atlas of Juvenile M M P I Profiles. By S. R. HATHAWAY and E. D. MONACHESI. Minneapolis: Minnesota University Press. (London: Oxford University Press) 1961. Pp. 402. Price 64s.

Studies in Management. By GUY HUNTER. London: University of London Press Ltd., 1961. Pp. 158. Price 10s. 6d.

Behavioral Approaches to Accident Research. By HERBERT H. JACOBS and others. New York: Association for the Aid of Crippled Children, 1961. Pp. ix + 178. Price \$1.50.

- Psychology: An introduction Study of Human Behavior.* By HENRY CLAY LINDGREN and DONN BYRNE. New York : Wiley, 1961. Pp. xi + 429. Price : 52s.
- Personality.* By ROBERT W. LUNDIN. New York : The Macmillan Co., 1961. Pp. xi + 450. Price 40s.
- The Manager and the Organisation.* By ERIC MOONMAN. London : Tavistock Publications, 1961. Pp. xi + 221. Price 21s.
- Men, Money and Motivation.* By A. PATTON. New York : McGraw-Hill, 1961. Pp. xi + 233. Price 58s.
- Job Analysis.* By H. E. ROFF and T. E. WATSON. London : Institute of Personnel Management, 1961. Pp. 40. Price 7s. 6d.
- The Skills of Interviewing.* By ELIZABETH SIDNEY and MARGARET BROWN. London : Tavistock Publications, 1961. Pp. xii + 396. Price 35s.
- Technical Education Abstracts.* INFORMATION SERVICE OF THE NATIONAL FOUNDATION FOR EDUCATIONAL RESEARCH IN ENGLAND AND WALES. Volume 1, No. 1, April 1961. £2 2s. od. per annum.
- Productive Thinking.* By MAX WERTHEIMER. Edited by MICHAEL WERTHEIMER. London : Tavistock Publications, 1961. Revised and enlarged edition. Pp. xvi + 302. Price 28s.

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OCCUPATIONAL PSYCHOLOGY

OCTOBER 1961

VOLUME 35 NUMBER 4

The 1959 House of Commons

By JOHN COHEN and PETER COOPER

(i) INTRODUCTION

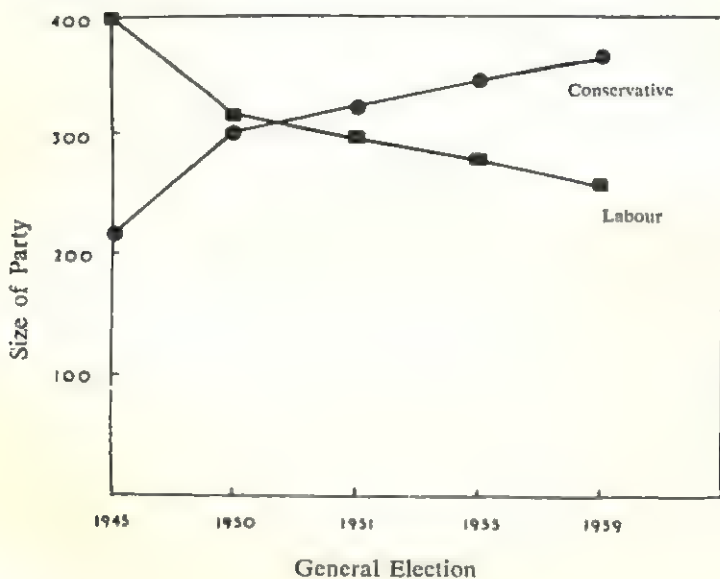
IN October, 1959, as soon as the results of the General Election were announced, we wrote to the Members of the newly-elected House inviting them to complete a biographical questionnaire, a copy of which is appended. 552 (88 per cent) of the 630 Members did so, and 12 others advised us where to find the information we sought. Only 2 of the 103 New Members failed to reply. We take this opportunity of thanking Members for their courteous letters.

The questions themselves, innocuous though they may be, are not entirely free from ambiguity. Nevertheless the vast majority of Members did not seem to encounter any difficulty in interpreting them. The few exceptions are exemplified by the Member who wrote: "What you are apparently asking me to say is whether I am a horny-handed son of toil or an intellectual. I am neither. I abstain from manual labour except in the house and garden and I possess no intellect". One or two Members felt that the questions were too intimate. Others would have welcomed an attempt to probe more deeply into their inner life and character. Revealing as such an examination might conceivably be, it could not be based on the crude method of questionnaires, which we are forced to use when no better method is practicable. If we have not ventured to draw breath-taking conclusions it is not because of a lack of desire to do so but because the answers to our questions at best enable us to describe the House, not to explain it.

365 Conservative Members were elected, one for each day of the year, and 258 Labour Members, one for each working day. The trend, apparent in the three previous elections, towards an increase in Conservative and a decrease in Labour membership, was maintained in 1959 (see Fig. 1). If this were subject to natural law, and if there were no discontinuities—assumptions which we are not prepared to make—we might predict that after thirteen further elections, shortly after the year 2000 A.D., the Labour Party would

have disappeared from the House, although the Liberals would still maintain their strength at six Members! Those who find this prospect unpalatable will prefer to employ the 'swing of a pendulum' as a model for predicting future Governments,¹ a model which has been described more precisely by analogy with epidemiological phenomena.² On this basis, any swing to the right would be periodically 'corrected' by a swing to the left.

FIG. 1: SIZE OF CONSERVATIVE AND LABOUR PARTIES AT EACH GENERAL ELECTION, 1945 TO 1959

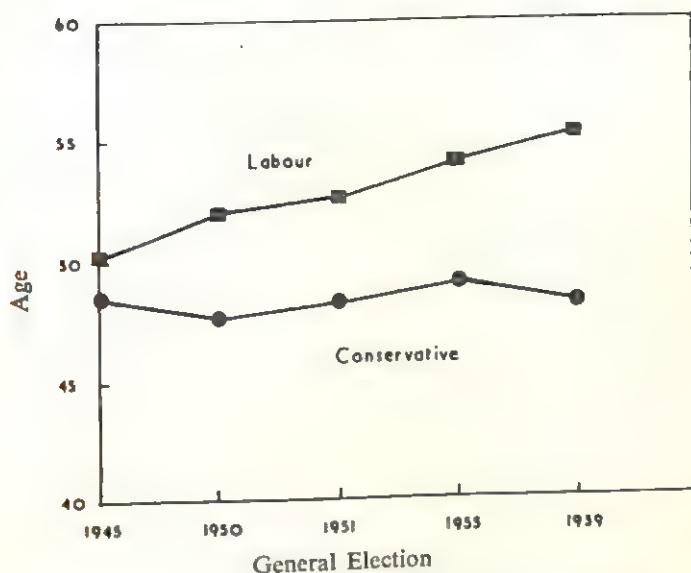


(ii) AGE

The average age of Members of the Parliamentary Labour Party has steadily increased since 1945; that of Conservative Members has remained stubbornly unchanged. The difference in average age grew from two years in 1945 to seven years in 1959 (see Fig. 2), and will increase to the extent that the Labour Party continues to be replenished by young Members relatively less than the Conservative Party. On such an assumption, we can expect the next election to yield a Labour Party ten years older than the Conservative Party. This possibility will not be contemplated by the Labour Party with any great elation unless it esteems advanced age as such, in which case we should expect its Shadow Cabinet to be of riper years than the rank and file. In fact, it is more youthful by two years.

The average age of Labour Members elected in 1959 was 55 years, that of Conservative Members 48. A third of Labour's strength was over the age of 60, including 18 mellow septuagenarians, as against 4 on Conservative benches, only one-tenth of which were occupied by the over sixties; all those who had not yet reached the age of 30 sat on these benches.

FIG. 2: AVERAGE AGE OF MEMBERS OF CONSERVATIVE AND LABOUR PARTIES AT EACH GENERAL ELECTION, 1945 TO 1959



The senescence of Labour Members does not come as a surprise for two reasons. Many of them have to win their spurs in other walks of life before they can gain enough support for nomination; consistent with this view is the higher age of New Labour as compared with New Conservative members. Secondly, Labour Members more often lack independent means. They may therefore, as D. E. Butler³ suggests, remain in the House beyond the age at which Conservatives retire.

These Party differences in chronological age are not important in themselves, but only in so far as they are associated with Parliamentary effectiveness. Since there is no measure of this, an optimum Parliamentary age, or range of ages, cannot be determined; and we are free to choose, in the extreme instance between a brand-new firework and an extinct volcano.

(iii) SEX

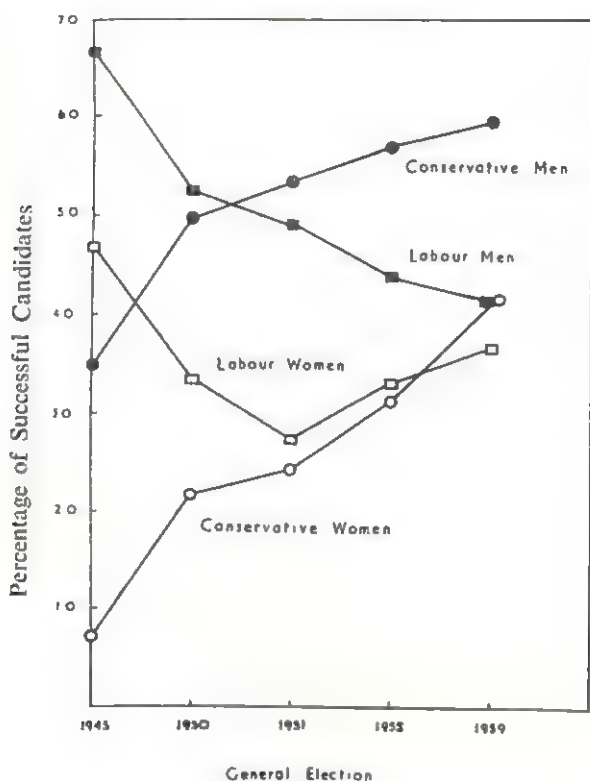
Sex differences as such are perhaps of no more consequence in the House than differences in age, unless they bear upon political vigour and values. If women Members voted like their male counterparts on all issues, there would not be a great deal to choose between them, and the same is true of the political vote generally. A lack of distinctiveness in women voters was, in fact, feared in certain quarters before the female suffrage was granted. Such fears have not turned out to be entirely groundless; the millennium has not been achieved by conceding to women the right to vote.

Nevertheless those who claim that women should play their equal part with men in affairs of State will feel disappointed with the outcome of the 1959 election. Of the 1,536 candidates of all Parties, 76 (or 5 per cent) were

women; 25 were successful. In both major Parties the proportion of women candidates elected was less than that of men: 41 and 59 per cent in the Conservative, and 36 and 42 per cent in the Labour Party.

This Conservative difference has remained constant since 1945. Among Labour candidates the proportion of women elected increased in the 1955 election, and again in 1959. The trend is such that in 1964 (if not sooner) Labour women may have a greater chance of being elected than Labour men (see Fig. 3).

FIG. 3: PERCENTAGE OF SUCCESSFUL MEN AND WOMEN CANDIDATES, 1945 TO 1959



We cannot, however, envisage the establishment of a British gynaeocracy of any political hue until women candidates present themselves in equal numbers with men. Even this would not be enough so long as we continue to train girls as second-rate boys, and so long as women are content to be, educationally at least, second-rate men, or playthings. Many women who engage in political activities can hardly help being feeble replicas of their male counterparts, whose voices they echo in their own assemblies. Such women may be unable to win a seat in the House because of the difficulty in persuading either men or women to vote for them. And when women are educated as women, it will perhaps no longer be idle to speculate what

the state of the world might be if, for an experimental period, half of the members of the Security Council and General Assembly were to be replaced by their wives or mothers.

(iv) EDUCATION

The 1959 House is true to form in that the Members of its two major Parties in the main fall naturally into two species: Eton-Balliol and Elementary School-W.E.A., and their respective variants. Four-fifths of Conservative Members, Old and New alike, are ex-public school boys, a proportion which is more than twice as large as among unsuccessful Conservative candidates. The Eton-Harrow element in the Party has declined by 13 per cent since the inter-war years and now stands at 25 per cent. In spite of this setback, public school representation in the Party has remained stable. Only one Conservative Member explained why he went to Eton; he pleaded, 'in mitigation', that he won a scholarship.

One-third of Members, and rather more New Members, of the Parliamentary Labour Party only attended an elementary school, although many of them subsequently sat at the feet of a sage tutor in an adult class. A further sixth received some so-called secondary education, though not in a grammar or public school. One-fifth of the same Party sports an 'old school tie', a proportion which has remained unaltered since 1945.

From 1918 to 1955 each successive election yielded a slightly larger proportion of Members with a university education. This is true of both major Parties. In 1959 the proportion among Conservative Members stood at 60 per cent, and among Labour Members at 42 per cent. In both Parties, a larger proportion of the Old than of New had received a university education, though it should be noted that many Members happily discovered founts of wisdom outside the universities. 28 Conservatives and 19 Labour Members owe something to Ruskin College, Teachers' Training Colleges, Sandhurst, and Greenwich Naval College.

Between 1918 and 1959 there was little or no change in the proportions of Conservative Members educated at Oxford, Cambridge, London, or the provincial universities respectively. By contrast, Labour members trained at Oxford rose from an inter-war average of 17 per cent to 26 per cent in 1945, at which level it has remained; the corresponding proportion trained at Cambridge declined from an inter-war average of 22 per cent to 10 per cent in 1959. Oxford and Cambridge together supply nearly four-fifths of university-educated Conservatives and two-fifths of university-educated Members of the Labour Party. The four favoured Oxford colleges are Balliol, Christ Church, Magdalen and New, although Trinity, the Conservative favourite at Cambridge, provided twice as many Conservative Members as any other college anywhere.

The badge of Oxford is much less prominent among the unsuccessful candidates of both Parties. It does not, however, follow that a sojourn at Oxford provides a season ticket of entry to the House, for those who choose

or are chosen to reside there may be pre-selected for their electorate appeal.

322 Members attended 379 university courses: a third in arts, a quarter in law, a fifth in social studies, a tenth in science or medicine, and a tenth in miscellaneous courses. Conservatives favoured arts and law, and Labour Members social studies.

Is a university education really of value to Members in the discharge of their Parliamentary duties, apart from any personal significance it might have for them? It must be stated, in reply, that a common background of academic training fails to temper the vehemence of political differences. Political affiliation overrides everything. The annals of Parliament do not record a single issue in which the protagonists were divided into those with and those without a university education. Nor is there any way of determining whether the academically trained vote for wiser or better decisions. We must therefore warn against any unduly optimistic belief that we should be within sight of Utopia if all Members had taken a degree.

(v) OCCUPATION

The professions, the Armed Forces, and business and blackcoat trades were the three nurseries of future Conservative Members; the dismal expression 'blackcoat', we should add, merely serves to designate those toiling in offices and shops and carries no reference to undertakers or pallbearers. Nearly two-thirds of Labour Members tasted work for the first time in a manual or blackcoat trade; another quarter received a professional training. They were, as a rule, first employed at a more tender age than their Conservative cousins.

That the House is rich in Members with knowledge of life in the raw is clear from a few examples: one Member "went into mines at 14 years of age, came out at 46 years of age"; another began his career as a "waiter and kitchen-hand in an all-night cafe and brothel in Soho"; and no fewer than 34 Members were familiar with dead-end jobs, before they entered politics, from their activities as errand or newspaper boys.

One-third of Members of each major Party can draw upon experience of administration, social or public. Some of these have in addition personal knowledge of the affairs of local government. Although the extent of such rumination has remained unchanged at three-fifths of the Labour Party since 1945, in the Conservative Party it has increased from about one-quarter in the four previous elections to two-fifths in the present House. Conservatives can take pride in 247 warriors as against 98 ex-fighting men occupying Labour benches. The superiority, if any, of the small number of New Labour Members, as compared with the Old, lies in their greater administrative experience, whilst New Conservatives surpass the Old in having grazed more widely in local pastures.

The details given by Members, especially newcomers to the House, about their present occupation are sometimes hard to interpret. They may be referring, in the first place, to their occupations before election, although

they now intend to devote themselves to full-time parliamentary duties, or they may be thinking in terms of future plans. Secondly, it is not possible, as in the case of age and education, to compare the 1959 House with earlier Houses. Thirdly, there is some artificiality in the occupational categories listed in our questionnaire in that they are not necessarily mutually exclusive. For example, a man may be a company director as well as the owner of a private business; at least one Member felt that he could be both of these as well as a shareholder, an employer and an employee. Another Member repudiated the idea that he might conceivably belong to any one or more of these five categories by recording "No! No! No! No!", and a Labour Member declared that "Every director is an employee and an employer". Some artificiality in setting the questions was inescapable without circumlocution, which we were naturally anxious to avoid in addressing those whose brevity of utterance finds in Hansard a silent and imperishable monument.

A number of Members replied to the question, 'What is your present occupation?' by writing 'M.P.', followed by one or more exclamation marks, which we take to mean that they are not otherwise engaged. 40 per cent of the combined major Parties said that they were wrapped up in full-time parliamentary duties, 30 per cent were immersed in business, 13 per cent in law, and 17 per cent in other activities.

Turning to Party differences, we find that one in every two Labour Members is a full-time M.P. as compared with one in three Conservatives. Hardly any *New* Conservatives described themselves as full-time M.P.'s whereas two-fifths of *New* Labour Members did so. These differences may be related to the fact that fewer than 10 per cent of Labour Members are in business as compared with nearly fifty per cent of Conservatives; relatively more Labour Members are in the professions and trades. A larger proportion of New than of Old Labour Members are full time Trade Union officials.

The expression 'full-time M.P.' requires some clarification. Among the Conservatives, 99 described themselves as such. Of these, 44 said they held Government appointments. A further 37 stated that they were company directors, owners of businesses, or shareholders. This leaves 18 who appear to rely solely on their parliamentary salary. Precisely five times as many Labour Members (*i.e.*, 90), so far as we know, have no income other than their official wage. It is not inconceivable that some of the 108 are in receipt of some sponsored pocket-money. A further 24 full-time Labour Members said that they were engaged in political activities or described themselves as company directors, owners of businesses, or shareholders.

Half of the Members of the House are shareholders: one in five on the Labour benches and only seven in every ten Conservatives. It is an extraordinary fact, the significance of which has yet to be demonstrated, that shareholders figure more prominently among old school tie Conservatives than among their Labour counterparts. At all events, we may rest assured that the House is highly sensitive to gentle rustling in the stock market.

At least one in every seven Members has a legal training and one in eight practises law. This formidable phalanx of lawyers together with a massive parade from commerce raises the question whether the House is not too homogeneous a body. A high degree of occupational diversification might be desirable because homogeneous groups become absorbed in microscopic examination of minutiae to which they attach a disproportionate significance. They are apt to become involved in bitter disputes, especially when they enlist in contests of hair-splitting, and the resulting tension spreads to larger issues. By contrast, a heterogeneous group is less given to pedantry, occupational or political, and better able to take a wider view. Hence, disputes between Parties seem less acrimonious than disputes within each Party.

Homogeneity of culture is not entirely a novelty in the House. Not much more than a century ago, if the Prime Minister of the day thought fit to quote Virgil he had no need to finish his sentence, "the whole House", as Maurois has said, "rose as one man to supply the end". The homogeneity today lies less in a familiarity with classical lore than in a uniformity of craft.

(vi) HOBBIES

The vast majority of our respondents cultivate hobbies. Nearly 80 per cent have two or more, and 8 per cent have one hobby only. Some of those who say they are hobby-less justify themselves by saying that they have no time. The 800 hobbies or recreations mentioned may be grouped into three categories. The first, which includes shooting, is traditionally associated with the leisured classes; the second is exemplified by the practices of walking and gardening, and the third is illustrated by such addictions as "eating good food", "annoying the Socialists", "being educated by grandchildren", the improvement of the alphabet, liturgiology, collecting netsuke, thinking and bowling. It is proper to add that those who claim "annoying the Socialists" to be their recreation are without exception supporters of the Government.

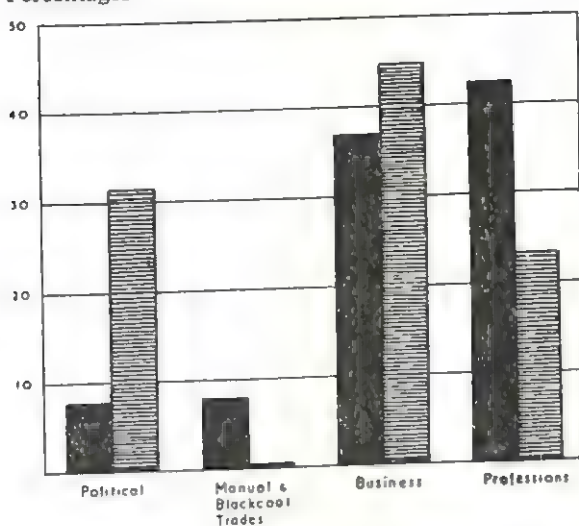
40 per cent of Conservatives as compared with a mere 12 per cent of Labour Members indulge in the first category. In the second category the preferences are reversed: 52 per cent of Labour and 27 per cent of Conservative Members.

A few Members describe as their hobby what most Members would call their occupation. Thus one describes politics as his work and business as his hobby. Another, celebrated for the frequency with which he does not see entirely eye-to-eye with his Party Whips, describes his first hobby as "doing as I please".

We could not have known in advance whether or not the House is a hobbyless community. The number and distribution of hobbies suggest that, in this respect at any rate, Members do not display any unusual stigmata which would mark them off from the rest of society.

FIG. 4: MEMBER'S OCCUPATION AND FATHER'S OCCUPATION—
CONSERVATIVE PARTY

Percentages



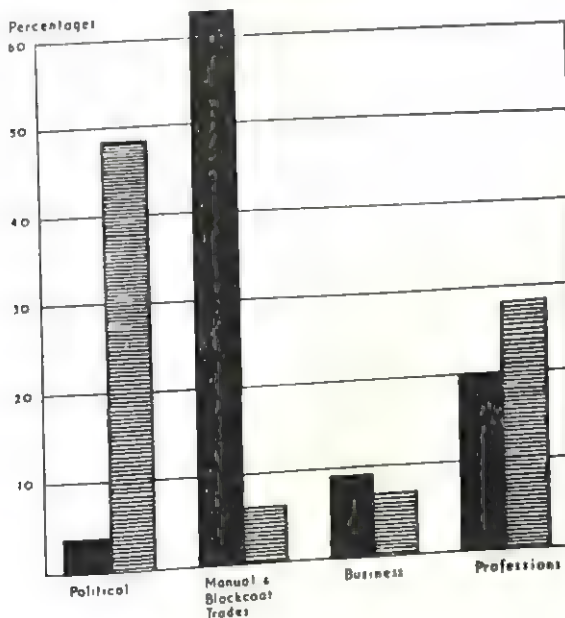
Father



Member

FIG. 5: MEMBER'S OCCUPATION AND FATHER'S OCCUPATION—
LABOUR PARTY

Percentages



Father



Member

(vii) FATHERS' OCCUPATION

"Author, journalist, landowner, businessman, navvy, foreman of railway camp, founder and leader of a political party, rolling stone" is the brief biography given by one Member of his father's career. But this versatility is altogether exceptional. The professions, business and trades claim Members' fathers in equal proportions, the first two categories being much more prominent among Conservative fathers, and the third among Labour fathers.

At least 6 per cent of Members' fathers were professional politicians, a higher figure than would be found among fathers of any ordinary group of citizens, but not necessarily high as compared with the proportion of professional fathers among professional men. The political paternity rate among Conservative Members is 8 per cent, and among Labour Members 4 per cent, a variation which may be due to differences in the size of the Parties a generation ago. If we added avuncular politicians, siblings and other kin, the Party difference would be still greater. Even now, one in every twelve Conservative Members ensures the perpetuation of the family political banner. It would seem that the attempt to dilute the genetic principle in the House of Lords by the creation of life peerages is being compensated in the House of Commons by the establishment of family dynasties. If so, we can perhaps look to the day when, by clandestine and imperceptible steps, the hereditary tradition will depart from the House of Lords and come to rest in the Commons.

We might expect political paternity in the Parliamentary Labour Party to be less frequent than in the Conservative Party to the extent that any sizable group of Labour politicians had smaller families, on the average, than a corresponding Conservative group. In this connexion, we may compare the 1950 Labour regime with the Conservative regime of 1951: members of the former had smaller families than members of the latter, there being no age difference. The high-ranking Labour politicians of 1950 have generated fewer political sons. It is possible to speculate that the cause of the difference in family size may lie in factors determining social mobility such as, for example, infertility. Thus an ambitious man of working-class origin could ascend a socio-political ladder more expeditiously if he were unencumbered by small children. A man of business or professional origin only has to climb a political ladder.

(viii) GOVERNMENT

The 63 members of the Government, including three women, after the 1959 election, were slightly younger, on the average, than their Party as a whole; and three years younger than the average age (50) of the three previous Governments. Members of the Cabinet were some five years older than the Conservative rank and file.

The proportion of public school men in the Government has dwindled,

since 1951, from 90 to a mere 80 per cent, but the resonant voice of Eton-or-Harrow remains unhushed, and more audible than among the Government's supporters.

In 1950, when a Labour Government was in office, less than two-fifths of its members were graduates. The proportion in the present Government is four-fifths, and it has increased by nearly 20 per cent since the 1951 election. The majority graduated in arts, law or social studies; relatively few made contact with science, and, as a body, are indebted to Oxford twice as much as to Cambridge.

Two-thirds first learnt the meaning of work in a lawyer's office or on the parade ground; the rest took to industry, commerce and the trades. Shareholders figure rather less prominently among them than among Conservative Members as a whole. Political paternity is rather more pronounced (one in ten) among Government members than among the Conservative rank and file, which may be attributable to the impact which high-ranking politicians, equipped with powerful personalities, make on their families.

(ix) SPONSORED MEMBERS

The number (129) of Labour candidates sponsored by Trade Unions in the 1959 election has remained practically the same since 1945, although the proportion elected has fallen from 96 to 71 per cent.

Candidates sponsored by Trade Unions are twice as likely to be elected as other Labour candidates. One reason for this might be that the Unions are more ready to support candidates with a strong appeal to the electorate. The probability of election is greater where there is a heavy concentration of members of a particular union in any one constituency as, for example, in mining areas. In fact, the 31 candidates sponsored by the National Union of Mineworkers were all elected. Fewer candidates are sponsored by the larger Unions whose members are less concentrated in particular regions than those of the National Union of Mineworkers.

Apart from sponsorship by Trade Unions, there are other forms of encouragement and assistance to candidates, although such aid does not necessarily ensure that the candidate will arrive at Westminster. Assistance of this kind is said to come from the National Spinsters' Pensions Association and the British Undertakers' Association, as well as from the National Farmers' Union, the National Union of Teachers, the Pharmaceutical Society, the British Medical Association and other bodies.⁴

There are also a large number of lobbying organizations or 'promotional groups',⁵ as they have been called, which attempt to bring influence to bear on the House of Commons in relation to the vital issues of the day. A host of such groups exists including the Anglers' Association, the Lord's Day Observance Society, and those organizations which are dedicated to abolish vivisection or to put a stop to telephone tapping by the police. The revision of the English alphabet is also the focus of immense zeal and devoted effort.

In some instances, Members receive an election expense allowance of a few hundred pounds, and a similar amount annually so long as they continue to represent their constituencies.

(x) REFLECTIONS ON SELECTION AND TRAINING⁶

The somewhat arid information we have considered scarcely permits momentous inferences. Nevertheless it prompts us to discuss certain issues which appear more significant than any we have raised so far. If our approach seems insufficiently reverent, this is due to the sceptical spirit of the age in which we live, an age which no longer takes it for granted that its legislators are divinely endowed with the wisdom and foresight which should grace those who govern their fellow men. We cannot therefore refuse to face the haunting questions: Who are the legislators? In what respects, if any, do they differ from the common run? Are they aflame with a greater spirit of devotion to the good of mankind? Can they see the world through the eyes of others, freer from any suspicion of dogmatism or bias, from any thought of self-seeking or personal aggrandisement? Have they been vouchsafed a vision of the world, however dim and obscure, in which men can live at peace with one another?

It is a little difficult, perhaps, to answer these simple questions even from a knowledge of a Member's age, sex, schooling and hobbies. Nor does precise information about the calling of his forebears greatly help us. What is more to the point is that no amount of knowledge of what a Member *is* can tell us what he *should* be. The high-mindedness and honesty of the British politician are, it is true, almost universally recognised. Nevertheless, even the British politician might occasionally ask himself whether he ever entertains some craving for political power or position, some voluptuous dream of Ministerial glamour.

No one, of course, would deny that Members of Parliament are human beings. This provides some guarantee that they can never escape at least some of the failings that afflict their fellows. But what assurance is there that Providence has not bestowed upon them a larger share? Parliamentary candidates in Britain are initially self-selected. A man thinks: 'I want to be an M.P.', just as he might think 'I want to be a lawyer or a butcher'. He has decided that he is worthy of representing the community. Might not this high self-valuation belie the unassuming modesty which should perhaps characterise every leader of the people? If a man, in effect, says: 'I choose myself to lead you', should we not reply that he disqualifies himself by this very act of self-selection?

The self-chosen, some twenty thousand strong, are scanned by local interviewing committees whose laudable intention it is to pick the best and finest candidate, and in this task they are occasionally prodded by their Party's Central Office. Unfortunately there is no way of knowing whether these committees operate as sieves or as filters, for they merely ensure that someone to their taste is allowed to proceed as a candidate.

Two thousand survive to undergo the martyrdom of elections where they can parade their virtues before an admiring electorate.

Is there then any alternative to the interviewing committees? One possibility might be a formal system of selection, like that submitted in 1952 by Monsieur Hippolyte Martel, President of the Federation of the Good People of France, to Monsieur Heriot, President of the French National Assembly. He proposed that leaders of all political parties should be examined by an expert body of psychiatrists, who would be empowered to give them, if they deserved it, a "certificate of aptitude for leading the country". These certificates, declared M. Martel, "would be for the politician what the driving licence is for the motorist". As a safeguard, he suggested that the psychiatrists themselves, before taking up their duties, should be examined by a panel of citizens "in possession of their full mental powers". He failed, however, to ensure that the citizens themselves should be in "possession of their full mental powers". Whether the third Republic might have lived on had the advice of Monsieur Martel been followed is a moot point, but we do not feel that his system should be introduced into England except as a very last resort.

Perhaps the solution lies in limiting candidates to those with a suitable training, preferably in science. The value of a scientific education for the future British politician has been advocated on two grounds: first, that he would more readily apprehend the impact of technological change on an industrial society; and second, he could bring into the political arena that flair for dispassionate assessment of a situation which a scientific training is supposed to cultivate. Assuming that a scientific education did produce such qualities, no one would dispute their value provided other virtues were not thereby displaced. But this is the practical difficulty. In any event there may be dangers in introducing an eminent scientist into an administrative or political milieu to which he is, so to speak, ecologically unadapted. We remind ourselves of Napoleon's experiment in appointing Laplace to a post of high administrative responsibility. He remarked: "A mathematician of the first rank, Laplace quickly revealed himself as only a mediocre administrator; from his first work we saw that we had been deceived. Laplace saw no question from its true point of view; he sought subtleties everywhere, had only doubtful ideas, and finally carried the spirit of the infinitely small into administration". We would not wish to generalize from so small a sample, which we take merely as an illustration. All the same, evidence of the value of a scientific education for all Parliamentary candidates can hardly be said to exist, and the same applies to any *particular* form of professional, industrial or other education.

Apart from the problem of drawing out the initial twenty thousand applicants from the general population or of choosing from them the best two thousand, is there a way of training the final 630 darlings of the electorate? That there may be some scope for training is brought home to us if we reflect on the extraordinarily bizarre spectacle of two rival political

blocs cherishing with equal passion the most divergent beliefs based on one and the same basis of fact. How is it possible, we may ask ourselves, that one politician can hold with supreme assurance that the possession of nuclear weapons is a deterrent to war while another can hold, with equal warmth, the conviction that they are likely to provoke war? Such an impasse might be explicable in terms of the very nature of the political mentality. Possibly candidates would not present themselves for Parliament in the first instance unless they were sublimely insensible to the possibility that they could ever be mistaken, and unless they enjoyed a capacity for transcending all uncertainty and misgivings, unencumbered by that gift for suspending judgment which hampers the ordinary man. Perhaps candidates dare not admit political ignorance because they are, by definition, well-informed men. Perhaps they must deny any inability to foreshadow the state of things to come for they are, again by definition, political seers, clinging to their political creed with overwhelming intensity, because in so far as they allowed any shadow of doubt to enter their minds, they would be accepting the possibility that their opponents might conceivably be correct, and this must at all costs be ruled out.

Speaking generally, if these features were characteristic of the political mind, the origin of Party differences might become clearer and we could begin to understand the extent to which such differences are due to misunderstanding of the opposing view, on the one hand, and to what extent they are due to diverse interests, on the other. If we could remove sources of misunderstanding, we should at least know where we stand, and recognise the interests for what they are worth. To be sure, if there is a reluctance to allow basic differences of interest to be laid bare, the issues will remain clouded, as frequently happens in international politics. If the head of a State makes a pronouncement the one certain thing is that he does not merely mean what he says. A small army of officials must get to grips with the task of deciphering his oracle. If he uttered A, he must presumably have meant A' as well, but since he knows that we can make this inference, he must also have meant B. He knows, too, that we can get as far as B, so we suppose that he implied B', and so on. In effect, his statement is deliberately stratified to mean different things to different countries, classes, groups, individuals. It means A, A', B, and B' and, perhaps, other things as well, for it may have been designed for internal consumption. The 'geological' structure of a political pronouncement is analogous to that of a dream with its manifest content, which may be trivial, and its varied latent content which may be highly significant, and perhaps requires similar techniques of interpretation.

Confining ourselves to interchanges bedevilled by genuine misunderstanding, can anything be done to remove it? ⁷ We know that a Member is, or is expected to be, perfectly familiar with his Party's policy, and once he has begun to make a speech, we can often guess what he is going to say and we could sometimes finish his speech for him. What we do not

know is whether he has grasped the policy of his opponents. In a court of justice, too, we know full well that counsel for the prosecution can state his *own* case, just as counsel for the defence can state *his*. What we do not know is whether each has a full and proper understanding of his opponent's viewpoint.

This unsatisfactory state of affairs might be improved if no one were allowed to criticise his opponents until he had satisfied them that he had grasped their point of view, and only then could he state his own case. Others present would also need to be assured of this. Let us assume that such a basic rule of procedure had been established in the House and that a debate on Capital Punishment has started. The opening speech for abolition is made by a retentionist, and he is followed by an abolitionist stating his case for retention. When each speaker hears *his* view presented by his opponent, he does at least have the opportunity of seeing it in a new light. And his opponent may discover that he has himself been objecting to something that he has not fully understood or has even misunderstood. If so, he will find it hard to insist on his objections so long as it is clear to others present that he has not apprehended the view which he rejects. Is it so entirely far-fetched to assume that in these circumstances each may be led to revalue his own ideas, and possibly begin to see some point in his opponents' objections? Such a procedure might thus have the salutary effect of impelling Members to make a genuine effort to understand the views of others, an effort which they have perhaps never found it necessary, or even possible, to make before. The very struggle to understand may be the beginning of reconciliation. Nevertheless, however cordial our support for this procedure, we cannot hope that it could be effective in eliminating divergent interests, where there is no misunderstanding. If a man is hungry he must be fed, unless he can be persuaded that hunger is a good thing.

The sophisticated critic will doubtless say of this procedure that in the first place it is impracticable. Secondly, even if practicable, it would be too feeble to shake the rock-like convictions of Members which are held on both sides of the House with equal and ample knowledge, intelligence and good will. If so, it is hard to escape the conclusion that Parliamentary discussion and debate are a waste of time. "Nothing that any of us can say can change his mind, which is that of a true believer", Mr. Walter Lippman has recently said of Mr. Krushchev; and we might suppose that Mr. Krushchev formed the same opinion of Mr. Lippman. Are we then to take it that the Prime Minister could say as much of the Leader of the Opposition, who could return the compliment?

The upshot, in brief, is not to defend a system of meaningless compromise which could lead, say, to the manufacture of *half* a hydrogen bomb, but to hope for a smog-free political atmosphere in which men would not conceal from themselves the fact that they did not know but would be ready to avow it.⁸

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APPENDIX

Note: the tables relating to age, sex and education are based on the total number of Members. The remaining tables are based only on respondents. From Table 2 onwards, the six Liberal Members and the Independent Member are excluded. The historical tables relate to total membership of the House or the Government. Tables 4e to 4g relate not to individual Members but to universities attended. Thus some Members attended more than one university. The same applies to Tables 4h and 4i and to Tables 10d. and 10e.

TABLE 1: NUMBER OF RESPONDENTS AND NON-RESPONDENTS BY PARTY*

	CONSERVATIVES		LABOUR		LIBERAL		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Respondents ..	316	86.6	230	89.1	6	100.0	552	87.6
Non-respondents	49	13.4	28	10.9	—	—	77**	12.4
TOTAL ..	365	100.0	258	100.0	6	100.0	629**	100.0

* The number for each Party includes the Party's Associates (e.g. Ulster Unionist).

** Excluding one Independent member.

TABLE 2: AGE OF MEMBERS

AGE				CONSERVATIVE		LABOUR		TOTAL	
				NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Under 30	..	..	..	11	3.0	—	—	11	1.8
30-39	..	..	..	62	17.0	18	7.0	80	12.8
40-49	..	..	..	135	37.0	61	23.6	196	31.5
50-59	..	..	..	121	33.2	98	38.0	219	35.2
60-69	..	..	..	32	8.8	63	24.4	95	15.2
70 and over	..	..	..	4	1.1	18	7.0	22	3.5
TOTAL	..	..	..	365	100.0	258	100.0	623	100.0
MEDIAN	..	..	..	48.1		55.1		51.1	

TABLE 2a: AGE OF OLD AND NEW MEMBERS

PERCENTAGES

AGE				CONSERVATIVE		LABOUR		TOTAL	
				OLD	NEW	OLD	NEW	OLD	NEW
Under 30	..	..	..	1.4	9.9	—	—	0.8	6.9
30-39	..	..	..	11.9	38.0	4.8	22.6	8.8	33.3
40-49	..	..	..	36.7	38.0	21.6	38.7	30.1	38.2
50-59	..	..	..	37.8	14.1	38.8	32.3	38.2	19.6
60-69	..	..	..	10.9	—	26.9	6.5	17.9	2.0
70 and over	..	..	..	1.3	—	7.9	—	4.2	—
TOTAL	..	..	..	100.0	100.0	100.0	100.0	100.0	100.0
Per cent	..	..	..	294	71	227	31	521	102
No. ..	..	..	..	50.0	40.6	56.1	47.1	52.7	42.6
Median	..	..	..	50.0		47.1		52.7	

TABLE 3: MEN AND WOMEN MEMBERS BY PARTY

MEMBERS	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Men	353	96.7	245	95.0	598*	96.0
Women	12	3.3	13	5.0	25	4.0
TOTAL	365	100.0	258	100.0	623	100.0

* In addition there were six Liberals and one Independent.

TABLE 4: SCHOOLS ATTENDED

SCHOOL	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Elementary only	8	2.2	88	34.1	96	15.4
Secondary or Technical ..	13	3.6	42	16.3	55	8.8
Grammar	54	14.8	73	28.3	127	20.4
Public						
Eton or Harrow	91	24.9	3	1.1	94	15.1
Other	192	52.6	50	19.4	242	38.8
Others*	7	1.9	2	0.8	9	1.4
TOTAL	365	100.0	258	100.0	623	100.0

* Including some who went to private schools or who were privately educated and a few whose schooling is unknown.

TABLE 4a: SCHOOLS ATTENDED BY OLD AND NEW MEMBERS

SCHOOL	PERCENTAGES					
	CONSERVATIVE		LABOUR		TOTAL	
	OLD	NEW	OLD	NEW	OLD	NEW
Elementary only	2.7	—	32.6	45.2	15.7	13.7
Secondary or Technical ..	3.1	9.8	16.7	12.9	9.0	7.8
Grammar	13.9	18.3	27.3	35.5	19.8	23.5
Public						
Eton or Harrow	27.2	15.5	1.3	—	15.5	10.8
Other	50.7	60.0	21.1	6.5	38.2	44.1
Others*	2.4	—	0.9	—	1.7	—
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Per cent	294	171	227	31	521	102
No.						

* See footnote to Table 4.

TABLE 4b: SCHOOLS ATTENDED, 1918-1959

PERCENTAGES

ELECTION*	CONSERVATIVE				LABOUR			
	ETON OR HARROW	OTHER PUBLIC	NON-PUBLIC	TOTAL	ETON OR HARROW	OTHER PUBLIC	NON-PUBLIC	TOTAL
1918-1935	38	41	21	100	3	7	90	100
1945 ..	36	49	15	100	3	21	76	100
1950 ..	35	50	15	100	3	20	77	100
1951 ..	33	50	17	100	3	21	76	100
1955 ..	29	47	24	100	1	21	78	100
1959 ..	25	53	22	100	1	19	80	100

* See Ross (1955, p. 417) for the elections 1918-1951, and Butler (1955, p. 42) for the 1955 election.

TABLE 4c: MEMBERS WITH A UNIVERSITY EDUCATION, 1918-1959

PERCENTAGES

ELECTION*	CONSERVATIVE			LABOUR		
	UNIVERSITY	NONE	TOTAL	UNIVERSITY	NONE	TOTAL
1918-1935	52.0	48.0	100.0	14.6	85.4	100.0
1945	57.5	42.5	100.0	32.0	68.0	100.0
1950	61.0	39.0	100.0	36.5	63.5	100.0
1951	63.0	37.0	100.0	37.5	62.5	100.0
1955	63.4	36.6	100.0	39.7	60.3	100.0
1959	59.7	40.3	100.0	41.9	58.1	100.0

* See Ross (1955, p. 424) for the elections 1918-1951, and Butler (1955, p. 42) for the 1955 election.

TABLE 4d: OLD AND NEW MEMBERS WITH A UNIVERSITY EDUCATION

PERCENTAGES

UNIVERSITY	CONSERVATIVE		LABOUR		TOTAL	
	OLD	NEW	OLD	NEW	OLD	NEW
At least one	61.9	50.7	44.5	22.6	54.3	42.2
None	38.1	49.3	55.5	77.4	45.7	57.8
TOTAL						
Per cent	100.0	100.0	100.0	100.0	100.0	100.0
No.	294	71	227	31	521	102

TABLE 4e: UNIVERSITIES ATTENDED BY CONSERVATIVE MEMBERS,
1918-1959

ELECTION*	PERCENTAGES				
	OXFORD	CAMBRIDGE	LONDON	OTHERS	TOTAL
1918-1935 ..	43.2	32.4	6.1	18.2	100.0
1945 ..	46.6	33.1	3.0	17.3	100.0
1950 ..	47.4	33.0	4.6	14.9	100.0
1951 ..	47.7	32.2	4.2	15.9	100.0
1955 ..	48.2	35.3	16.5		100.0
1959 ..	43.6	33.3	4.5	18.5	100.0

* See Ross (1948, p. 53) for elections 1918-1935; Ross (1955, p. 418) for elections 1945-1951, and Butler (1955, p. 42) for the 1955 election.

TABLE 4f: UNIVERSITIES ATTENDED BY LABOUR MEMBERS, 1918-1959

ELECTION*	PERCENTAGES				
	OXFORD	CAMBRIDGE	LONDON	OTHERS	TOTAL
1918-1935 ..	17.0	21.6	20.5	40.9	100.0
1945 ..	26.0	14.4	20.5	39.0	100.0
1950 ..	25.7	13.2	18.4	42.6	100.0
1951 ..	29.5	13.2	16.3	41.1	100.0
1955 ..	26.4	15.5	58.2		100.0
1959 ..	26.6	10.2	28.1	35.1	100.0

* See footnotes to Table 4e.

TABLE 4g: ATTENDANCE BY OLD AND NEW MEMBERS AT UNIVERSITIES

UNIVERSITY				PERCENTAGES					
				CONSERVATIVE		LABOUR		TOTAL	
				OLD	NEW	OLD	NEW	OLD	NEW
Oxford .. ..	..	..	..	43.1	46.3	27.5	12.5	37.3	40.8
Cambridge .. ..	..	..	..	35.6	22.0	10.0	12.5	26.1	20.4
London* .. ..	..	..	..	4.5	4.9	27.5	37.5	13.0	10.2
Provincial .. ..	..	..	..	14.4	19.5	27.5	37.5	19.3	22.4
Abroad.. ..	..	..	..	2.5	7.3	7.5	—	4.3	6.1
TOTAL									
Per cent .. ..	..	..	..	100.0	100.0	100.0	100.0	100.0	100.0
No. .. ..	..	..	..	202	41	120	8	322	49

* Including one Old Conservative and four Old Labour Members who took external degrees.

TABLE 4h: UNIVERSITY COURSES TAKEN

COURSE	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Arts	88	36.5	36	27.7	124	32.9
Science	27	11.2	6	4.6	33	9.0
Medicine	5	2.1	7	5.4	12	3.2
Social Studies	40	16.6	39	30.0	79	21.2
Law	62	25.7	20	15.4	82	22.8
Others or not known	19	7.9	22	16.9	41	10.9
TOTAL	241	100.0	130	100.0	371	100.0

TABLE 4i: UNIVERSITY COURSES TAKEN BY OLD AND NEW MEMBERS

PERCENTAGES

COURSE	CONSERVATIVE		LABOUR		TOTAL	
	OLD	NEW	OLD	NEW	OLD	NEW
Arts	36.8	35.0	28.7	12.5	33.7	31.3
Science	10.4	15.0	4.9	—	8.4	12.5
Medicine	2.5	—	4.9	12.5	3.4	2.1
Social Studies	16.9	15.0	28.7	50.0	21.4	20.8
Law	25.4	27.5	15.6	12.5	21.7	25.0
Others or not known	8.0	7.5	17.2	12.5	11.5	8.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Per cent.	201	40	122	8	323	48
No.						

TABLE 4j: MEMBERS WHO RECEIVED SOME FORM OF FURTHER EDUCATION

	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
University	218	59.7	108	41.9	326	53.3
College*	28	7.7	19	7.4	47	7.5
Adult Education Class**	4	1.1	87	33.7	91	14.6
None	115	31.5	44	17.1	159	25.5
TOTAL	365	100.0	258	100.0	623	100.0

* Any full-time institution other than a university. The Conservative figures relate mainly to Members attending military or naval academies. The Labour figures include six who attended Ruskin College, Oxford, and one educated at a Service Academy. The figures exclude one Conservative and five Labour Members who also attended university.

** Excluding one Conservative and nine Labour Members who also attended a university or college.

TABLE 5: AGE AT ENTERING FIRST EMPLOYMENT

AGE				CONSERVATIVE		LABOUR		TOTAL	
				NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Under 16	..	..	..	16	5.1	102	44.3	118	21.6
16-20	..	..	..	151	47.8	61	26.5	212	38.8
Over 20*	..	..	..	149	47.1	67	29.1	216	39.6
TOTAL	..	..	..	316	100.0	230	100.0	546	100.0

* Including four Conservative Members and one Labour Member who stated that they had never entered employment.

TABLE 5a: AGE OF OLD AND NEW MEMBERS AT ENTERING FIRST EMPLOYMENT

AGE				PERCENTAGES					
				CONSERVATIVE		LABOUR		TOTAL	
				OLD	NEW	OLD	NEW	OLD	NEW
Under 16	..	..	..	6.1	1.4	42.0	60.0	22.3	19.0
16-20	..	..	..	45.1	57.1	27.0	23.3	37.0	47.0
Over 20*	..	..	..	48.8	41.4	31.0	16.3	40.8	34.0
TOTAL	..	..	..	100.0	100.0	100.0	100.0	100.0	100.0
Per cent	..	..	..	246	70	200	30	446	100
No. ..	..	..	..			

* Including four Old Conservative Members and one Old Labour Member who stated that they had never entered employment.

TABLE 5b: FIRST EMPLOYMENT

EMPLOYMENT				CONSERVATIVE		LABOUR		TOTAL	
				NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Manual or Blackcoat trades	..	..	..	59	18.7	142	61.7	201	36.8
Business	..	..	..	41	13.0	2	0.9	43	7.9
Armed Forces	..	..	..	94	29.7	12	5.2	106	19.4
Professions	..	..	..	110	34.8	69	26.6	179	32.6
Others	..	..	..	12	3.8	5	2.2	17	3.1
TOTAL	..	..	..	316	100.0	230	100.0	546	100.0

TABLE 5C: FIRST EMPLOYMENT OF OLD AND NEW CONSERVATIVE AND LABOUR MEMBERS

EMPLOYMENT	PERCENTAGES					
	CONSERVATIVE		LABOUR		TOTAL	
	OLD	NEW	OLD	NEW	OLD	NEW
Manual or Blackcoat trades ..	18.4	20.0	60.0	73.3	37.0	36.0
Business	13.8	10.0	1.0	—	8.1	7.0
Armed Forces	28.5	34.3	4.5	10.0	17.7	27.0
Professions	35.3	32.9	32.5	13.3	34.1	27.0
Others	4.1	2.9	2.0	3.3	3.1	3.0
TOTAL						
Per cent	100.0	100.0	100.0	100.0	100.0	100.0
No.	246	70	200	30	446	100

TABLE 6: PRESENT OCCUPATION

OCCUPATION	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
M.P. (full-time)	99	31.3	111	48.3	210	38.5
Manual or Blackcoat trades ..	1	0.3	14	6.1	15	2.7
Business	142	44.9	16	7.0	158	28.9
Professions:						
Law	44	13.9	24	10.4	68	12.5
Journalism, Writing	12	3.8	22	9.6	34	6.2
Others	18	5.6	19	8.3	37	6.8
Trade Unions	—	—	19	8.3	19	3.5
Others	—	—	5	2.2	5	0.9
TOTAL	316	100.0	230	100.0	546	100.0

TABLE 6a: PRESENT OCCUPATION OF OLD AND NEW MEMBERS

OCCUPATION	PERCENTAGES					
	CONSERVATIVE		LABOUR		TOTAL	
	OLD	NEW	OLD	NEW	OLD	NEW
M.P. (full-time)	38.9	4.3	49.5	40.0	44.4	15.0
Manual or Blackcoat trades ..	0.4	—	5.0	13.3	2.5	4.0
Business	40.2	61.4	6.5	10.0	25.1	46.0
Professions:						
Law	12.2	20.0	11.5	3.3	11.9	15.0
Journalism, Writing	2.8	7.1	11.0	—	6.5	5.0
Others	5.3	7.1	7.5	13.3	6.3	9.0
Trade Unions	—	—	7.0	16.7	3.1	5.0
Others	—	—	0.5	3.3	0.2	1.0
TOTAL						
Per cent	100.0	100.0	100.0	100.0	100.0	100.0
No.	246	70	200	30	446	100

TABLE 6b: SHAREHOLDERS

	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Shareholders	224	70.9	43	18.7	267	48.9
Non-shareholders	92	29.1	187	81.3	279	51.1
TOTAL	316	100.0	230	100.0	546	100.0

TABLE 6c: SHAREHOLDERS AMONG OLD AND NEW MEMBERS

	PERCENTAGES					
	CONSERVATIVE		LABOUR		TOTAL	
	OLD	NEW	OLD	NEW	OLD	NEW
Shareholders	72.4	65.7	21.0	3.3	49.3	47.0
Non-shareholders	27.6	34.3	79.0	96.7	50.7	53.0
TOTAL						
Per cent	100.0	100.0	100.0	100.0	100.0	100.0
No.	246	70	200	30	446	100

TABLE 7: NUMBER OF HOBBIES

HOBBY	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Two or more	253	80.1	167	72.6	420	76.9
One only	21	6.6	21	9.1	42	7.7
None	42	13.3	42	18.3	84	15.4
TOTAL	316	100.0	230	100.0	546	100.0

TABLE 7a: CLASSIFICATION OF THE TWO FIRST HOBBIES MENTIONED*

GROUP**	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
I	209	39.7	44	12.4	253	28.7
II	143	27.1	183	51.5	326	37.0
III	175	33.2	128	36.1	303	34.4
TOTAL	527	100.0	355	100.0	882	100.0

* Including 42 instances in which one hobby only is mentioned.

**I Comprises Travel, Tennis, Golf, Skiing, Riding, Shooting, Sailing and Fishing.

II Comprises Reading, Music, Gardening, Walking and Football.

III is a mixed category including, for example, "attempting to improve the alphabet," "eating good food," "annoying the socialists," "being educated by grand-children," "netsuke collecting," "scything," "putting rings round questionnaires."

TABLE 8: PREVIOUS EXPERIENCE

PREVIOUS EXPERIENCE	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Local government	124	39.2	135	58.7	259	47.4
None	192	60.8	95	41.3	287	52.6
TOTAL	316	100.0	230	100.0	546	100.0
Social or public administration*	110	34.8	81	35.2	191	35.0
None	206	65.2	149	64.8	355	65.0
TOTAL	316	100.0	230	100.0	546	100.0
Armed Forces	247	78.2	98	42.6	345	63.2
None	69	21.8	132	57.4	201	36.8
TOTAL	316	100.0	230	100.0	546	100.0

* 58 Conservatives and 55 Labour Members had experience of local government as well as social or administrative experience.

TABLE 8a: PREVIOUS EXPERIENCE OF OLD AND NEW MEMBERS

PERCENTAGES

PREVIOUS EXPERIENCE	CONSERVATIVE		LABOUR		TOTAL	
	OLD	NEW	OLD	NEW	OLD	NEW
Local government	35.4	52.9	59.0	56.7	46.0	54.0
None	64.6	47.1	41.0	43.3	54.0	46.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Per cent	246	70	200	30	446	100
No.						
Social or public administration	33.7	38.6	33.5	46.7	33.6	41.0
None	66.3	61.4	66.5	53.3	66.4	59.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Per cent	246	70	200	30	446	100
No.						
Armed Forces	80.1	71.4	45.5	23.3	64.6	57.0
None	19.9	28.6	54.5	76.7	35.4	43.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
Per cent	246	70	200	30	446	100
No.						

TABLE 9: FATHER'S OCCUPATION

FATHER'S OCCUPATION	CONSERVATIVE		LABOUR		TOTAL	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Political	25	7.9	9	3.9	34	6.2
Manual or Blackcoat trades ..	26	8.1	145	63.0	171	31.3
Business	117	37.0	21	9.1	138	25.3
Professions:						
Medicine	14	4.4	3	1.3	17	3.1
Law	25	7.9	7	3.0	32	5.9
Forces	34	10.8	1	0.4	35	6.4
Church	12	3.8	7	3.0	19	3.5
Others	49	15.5	28	12.2	77	14.1
Others	14	4.4	9	3.9	23	4.2
TOTAL	316	100.0	230	100.0	546	100.0

TABLE 9a: OLD AND NEW MEMBERS: FATHER'S OCCUPATION

PERCENTAGES

FATHER'S OCCUPATION	CONSERVATIVE		LABOUR		TOTAL	
	OLD	NEW	OLD	NEW	OLD	NEW
Political	7.7	8.6	4.5	—	6.3	6.0
Manual or Blackcoat trades ..	8.9	5.7	61.0	76.6	32.3	27.0
Business	32.9	51.4	9.5	6.7	22.4	38.0
Professions:						
Medicine	4.5	4.3	1.0	3.3	2.9	4.0
Law	7.3	10.0	3.5	—	5.6	7.0
Forces	11.8	7.1	0.5	—	6.7	5.0
Church	4.1	2.9	3.5	—	3.8	2.0
Others	17.4	8.6	13.0	6.6	15.5	8.0
Others	5.3	1.4	3.5	6.7	4.5	3.0
TOTAL						
Per cent	100.0	100.0	100.0	100.0	100.0	100.0
No.	246	70	200	30	446	100

TABLE 9b: OCCUPATION OF MEMBERS AND FATHERS

PERCENTAGES

OCCUPATION	CONSERVATIVE		LABOUR		TOTAL	
	FATHER	MEMBER	FATHER	MEMBER	FATHER	MEMBER
Political*	7.9	31.3	3.9	48.3	6.2	38.5
Manual or Blackcoat trades ..	8.1	0.3	63.0	6.1	31.3	2.7
Business	37.0	44.9	9.1	7.0	25.3	28.9
Professions	42.4	23.3	19.9	28.3	37.2	25.5
Others**	4.4	—	3.9	10.5	4.2	4.4
TOTAL: Per cent	100.0	100.0	100.0	100.0	100.0	100.0
Number	316	316	230	230	546	546

* Full time M.P. in the case of present Members, and any form of political career in the case of fathers.

** Including 19 (8.3 per cent) Trade Unionist Labour Members.

TABLE 10: AGE OF MEMBERS OF THE GOVERNMENT

PERCENTAGES			
AGE	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Under 30	—	3.6	3.0
30-39	9.5	18.5	17.0
40-49	52.4	33.8	37.0
50-59	31.7	33.4	33.2
60-69	6.3	9.3	8.8
Over 70	—	1.3	1.1
TOTAL			
Per cent	100.0	100.0	100.0
No.	63*	302	365
Median	47.2	47.8	47.7

* 53 Members completed the questionnaire and several others wrote to say where the information we sought was to be found.

TABLE 10a: MEMBERS OF THE GOVERNMENT WHO ATTENDED PUBLIC SCHOOLS, 1945-1959

PERCENTAGES					
SCHOOL	1945*	1950*	1951	1955	1959
Public	27.4	23.0	88.5	89.2	79.3
Others	72.6	77.0	11.5	10.8	20.6
TOTAL: Per cent	100.0	100.0	100.0	100.0	100.0
Number	62	61	61	65	65

* A Labour Government.

TABLE 10b: SCHOOLS ATTENDED BY MEMBERS OF THE GOVERNMENT

PERCENTAGES			
SCHOOL	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Elementary only ..	1.6	2.3	2.2
Secondary or			
Technical	3.2	3.6	3.6
Grammar	15.9	14.6	14.8
Public			
Eton or Harrow ..	30.1	23.8	24.9
Other	49.2	53.4	52.6
Others*	—	2.3	1.9
TOTAL			
Per cent	100.0	100.0	100.0
No.	63	302	365

* See footnote to Table 4.

TABLE IOC: GOVERNMENT MEMBERS WHO ATTENDED UNIVERSITY, 1945-59

UNIVERSITY	PERCENTAGES				
	1945*	1950*	1951	1955	1959
None	64.5	62.3	36.9	24.6	22.2
At least one ..	35.5	37.7	63.1	75.4	77.8
TOTAL: Per cent	100.0	100.0	100.0	100.0	100.0
Number	62	61	61	65	63

* A Labour Government.

TABLE IOd: MEMBERS OF THE GOVERNMENT WHO ATTENDED UNIVERSITIES

UNIVERSITY	PERCENTAGES		
	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Oxford	54.5	40.4	43.6
Cambridge	27.3	35.1	33.3
London	3.6	4.8*	4.5
Provincial	10.9	16.5	15.2
Abroad	3.6	3.2	3.3
TOTAL			
Per cent	100.0	100.0	100.0
No.	55	188	243

* See footnote to Table 4g.

TABLE IOe: UNIVERSITY COURSES TAKEN BY MEMBERS OF THE GOVERNMENT

COURSE	PERCENTAGES		
	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Arts	39.3	35.6	36.5
Science	11.5	11.1	11.2
Medicine	1.6	2.2	2.1
Social Studies ..	18.0	16.1	16.6
Law	21.3	27.2	25.7
Others or not known	8.2	7.8	7.9
TOTAL			
Per cent	100.0	100.0	100.0
No.	61*	180**	241

* Attended by 49 Members.

** Attended by 169 Members.

TABLE 10f: AGE AT ENTERING FIRST EMPLOYMENT OF MEMBERS OF THE GOVERNMENT

PERCENTAGES			
AGE	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Under 16	3.8	5.3	5.1
16-20	34.0	50.6	47.8
Over 20*	62.2	44.1	47.1
TOTAL			
Per cent	100.0	100.0	100.0
No.	53	263	316

* Including 4 non-Government Members who stated that they had never entered paid employment.

TABLE 10g: FIRST EMPLOYMENT OF MEMBERS OF THE GOVERNMENT

PERCENTAGES			
EMPLOYMENT	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Manual or Blackcoat trades	17.0	19.0	18.7
Business	11.3	13.3	13.0
Armed Forces ..	24.5	30.8	29.7
Professional ..	41.5	33.5	34.8
Others	5.7	3.4	3.8
TOTAL			
Per cent. . . .	100.0	100.0	100.0
No.	53	263	316

TABLE 10h: SHAREHOLDERS AMONG MEMBERS OF THE GOVERNMENT

PERCENTAGES			
	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Shareholders ..	62.3	72.6	70.9
Non-shareholders ..	37.7	27.4	29.1
TOTAL			
Per cent. . . .	100.0	100.0	100.0
No.	53	263	316

TABLE 10i: MEMBERS OF THE GOVERNMENT: FATHER'S OCCUPATION

FATHER'S OCCUPATION	PERCENTAGES		
	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Political	9.4	7.6	7.9
Manual or Blackcoat trade	16.9	6.5	8.1
Business	34.0	37.6	37.0
Professions:			
Medicine	9.4	3.4	4.4
Law	9.4	7.6	7.9
Forces	5.7	11.8	10.8
Church	5.7	3.4	3.8
Other	5.7	17.5	15.5
Others	3.8	4.6	4.4
TOTAL			
Per cent.	100.0	100.0	100.0
No.	53	263	316

TABLE 10j: MEMBERS OF THE 1950 (LABOUR) AND 1951 (CONSERVATIVE)
GOVERNMENTS AND THE NUMBER OF THEIR CHILDREN*

NUMBER OF CHILDREN	1950		1951	
	NO.	PER CENT	NO.	PER CENT
None	21	34.4	22	37.3
One or two	25	41.0	12	20.3
Three or more ..	15	24.6	25	42.4
TOTAL ..	61	100.0	59	100.0

* The probability of the differences in this Table occurring by chance is less than one in 20, and if the childless marriages and the unmarried Members are excluded, the probability is reduced to less than one in 100.

TABLE 10k: PREVIOUS EXPERIENCE OF MEMBERS OF THE GOVERNMENT

PREVIOUS EXPERIENCE	PERCENTAGES		
	GOVERNMENT	OTHER CONSERVATIVES	TOTAL
Local government ..	39.6	39.2	39.2
None	60.4	60.8	60.8
TOTAL			
Per cent.	100.0	100.0	100.0
No.	53	263	316*
Armed Forces ..	69.8	79.8	78.2
None	30.2	20.2	21.8
TOTAL			
Per cent.	100.0	100.0	100.0
No.	53	263	316

* 20 members of the Government had had experience of social or public administration; 12 of these had also had experience of local government.

TABLE II: LABOUR CANDIDATES SPONSORED BY TRADE UNIONS, 1945-1959

YEAR*	SPONSORED		OTHERS		SPONSORED MEMBERS AS A PROPORTION OF ALL LABOUR MEMBERS
	NO.	PER CENT ELECTED	NO.	PER CENT ELECTED	
1945	125	96	478	62	30
1950	140	79	477	49	35
1951	139	76	478	46	36
1955	128	75	492	41	35
1959	129	71	492	38	36

* See Richards (1959) for the elections 1945-55.

TABLE 12: COMPOSITION OF THE HOUSE BY PARTY, 1918-1959

ELECTION*	CONSERVATIVE	LABOUR	LIBERAL	OTHERS	TOTAL
1918-1935 (average)	358	154	94	8	615
1945	215	399	12	14	640
1950	299	315	9	2	625
1951	321	296	6	2	625
1955	345	277	6	2	630
1959	365	258	6	1	630

* See Ross (1955, p. 460) for elections 1918-1951 and *The Times House of Commons*, 1955 (1955, p. 24) for the 1955 election.

Confidential

No.....

**THE UNIVERSITY OF MANCHESTER
DEPARTMENT OF PSYCHOLOGY**

NAME in full.....

ADDRESS.....

In the questions that follow please reply by making a circle round the appropriate "code number" printed at the side of various possible answers.

When were you born?

Before 1880	...	...	...	...	1	1910—1919...	...	...	...	...	5
1880—1889	...	...	...	...	2	1920—1929...	...	...	...	...	6
1890—1899	...	...	...	...	3	1930—1939...	...	...	...	...	7
1900—1909	...	...	...	...	4						

Where were you Educated?

Preparatory School	...	...	...	...	8	Secondary School	...	...	...	...	11
Public Elementary School	...	...	...	...	9	Technical School	...	...	...	...	12
Grammar School	...	...	...	...	10	Public School (fee paying)	...	...	...	...	13

Name of School

Public School (non-fee paying) 14

Name of School

University(ies) 15

Please state
which one(s)Degree and
subject

Technical College 16

Degree and
subjectW.E.A. or other Adult Education
Classes 17

Subjects studied

What are your two main hobbies or recreations?

At what age did you first enter paid Employment?

Under 15 18	26—30... .. 21
16—20 19	31 and over 22
21—25 20	Never 23

What was your first employment?

What is your present occupation?

What is (was) your father's occupation?

Are you

a company director?... .. 24

an employer 27

a company shareholder? 25

an employee? 28

an owner of a private business? 26

Have you had previous experience in

the House of Commons?... .. 29

Social or Public Administration? 31

Local Government?... .. 30

the Armed Forces? 32

Satisfactions and Aspirations*

by JOHN D. HANDYSIDE

It is I think an open secret that the N.I.I.P. have been experimenting on a fairly large scale with questionnaire techniques, sometimes clearly against what they thought were their better judgments. In this paper I will put before you some of the results of our enquiries. But I must make it clear at the outset that this is no more than a progress report. I wish also to acknowledge the help of my collaborators, especially my N.I.I.P. colleagues, Brian Bartlett, Ruth Lancashire, Philip Limb, Jean Plummer, Mary Speak, Elizabeth Sykes and Michael Zimmerman; Alan Whittle, of the Tabulating Research Centre; the staff of the University of London Computer Unit; and the several thousand people who filled up questionnaires and permitted themselves to be interviewed about their satisfactions and aspirations in their working lives.

Christopher Scott (1961) has recently published a very full bibliography and systematic survey of relevant literature, but it may be useful for me to discuss briefly the evidence on the real or supposed limitations of questionnaire techniques before presenting our own experimental results.

There has been a marked tendency for occupational psychologists in this country to distrust self-administered questionnaire techniques, and to tend to rely much more heavily on interview methods as a source of data about job-satisfaction and similar issues. Wyatt and Marriott (1956) have provided a systematic study of the use of interview methods for this purpose, but give no comparative data for questionnaire techniques. Heron (1954) has reported the use of a method of combining the 'cafeteria' type of questionnaire item into an interview in an attempt to obtain the virtues of both. But on the whole the literature on the relative advantages and disadvantages of the two methods is scanty.

The protagonists of interview methods claim many advantages for them—validity, *i.e.* people do not tell lies if they are skilfully interviewed; sensitivity, *i.e.* the interviewer can see whether the respondent has understood the question; width of coverage, *i.e.* people can be got to talk extensively about the whole range of their occupational adjustment; and so forth.

The detractors of self-administering questionnaire techniques claim that blind analysis of paper-and-pencil responses may be seriously misleading; people may give flippant or otherwise dishonest answers to questionnaires which they would not give at interviews; people will misunderstand ques-

* The Chairman's Address to the Occupational Section of the British Psychological Society, given on 24 February, 1961. At the time Mr Handyside was Controller of Research at the National Institute of Industrial Psychology. He is now Manager, Personnel Research, Standard Telephones and Cables Limited.

tions and therefore give misleading answers; people will not answer questionnaires and therefore the results from questionnaire surveys will be badly biased by non-response; the questionnaire technique eliminates one of the major virtues of the interview attitude survey, the therapeutic effect of giving workers an opportunity to talk about their grievances with a sympathetic listener; and so forth.

These are arguable issues, and I do not propose to argue them now. It seems clear to me, however, that there are some occasions when one must make use of questionnaire techniques, which for all their reputed shortcomings, have two very obvious and undeniable advantages—they are rapid, and they are relatively inexpensive.

When therefore one does use questionnaire techniques there are two points which are likely to give rise to serious misgivings (i) how serious a bias is produced by non-response, because it is virtually certain that some of the people you issue questionnaires to will not answer them, and (ii) would you have got a very different estimate of the level of satisfaction in the factory if you had used the slower, more expensive, but possibly more valid interview method?

THE PROBLEM OF NON-RESPONSE

The main questionnaire we have been using, "How do you like your job?", is shown at Appendix I. It is based very substantially on that developed by Hoppock (1935), but we have introduced a new page of checklist items, and have replaced a number of his questions with alternatives of our own. Indeed we have made a number of alterations to our questionnaire as the research has proceeded, so that we have got answers to some questions for only a part of the sample of people we have been dealing with.

One of the points I wish to make about this questionnaire is that it is long! It consists of four fairly closely typed foolscap sides, and it poses in total some two hundred questions—if one counts each check list item as a question, and this is a reasonable assumption since subjects are required to decide whether or not to tick each item.

The method we have used for distribution and collection has been standard in all but one of the factories where we have carried out surveys. After we have held meetings with managers, foremen, works councillors, shop stewards or other key figures, and obtained consent to a survey being carried out, we choose a suitable day—usually a Tuesday, Wednesday, or Thursday—and on the morning of that day three or four members of the N.I.I.P. research team go round the factory visiting people at their actual place of work and give out the questionnaires and are available to answer questions about the survey. The tour is repeated in the afternoon to see if anyone has been missed on the morning round.

The following day the same people go round to collect the completed questionnaires—again a morning and an afternoon round. We also make suitable arrangements to cover shift workers, and we arrange to leave a small supply of questionnaires at the works gate or some such other place for anyone who gets missed in the delivery rounds. In case anyone is missed in the collection rounds we leave a supply of reply-paid envelopes at a suitable place so that completed questionnaires can be posted direct to us at the Institute—although in fact the questionnaires which have reached us in this way represent only a tiny fraction of the total.

This then is the basic situation—a long questionnaire, distributed to and collected individually from people at their work place; only twenty-four hours allowed for completion; virtually no reminders or chasing up procedures. This method has netted us percentage returns of 63, 60, 75, 51 and 62 in five different firms, giving us just over 4,700 questionnaires for analysis.

The one firm where we were forced to depart from this method of distribution and collection individually to people at their work places had a response rate of only 25 per cent. There were, however, probably several reasons for the low response rate in this firm, the method of issue and collection being only one of them.

Thus I think I can say with some justification that relatively simple and inexpensive arrangements can produce response rates which are by no means negligible. The psychologist man-hours involved are very tiny in comparison with those required to obtain similar data by interview. Provided that the geography of the factory is not unduly extended one person can quite reasonably cope with the issue and collection of questionnaires for 1,000 people.

The problem, however, is to know whether the people who do not return questionnaires differ significantly in their job-satisfaction from those who do answer. This is particularly important in view of the fact that one wants to compare the levels of satisfaction in different factories, and that the differences in response rates between factories may be substantial.

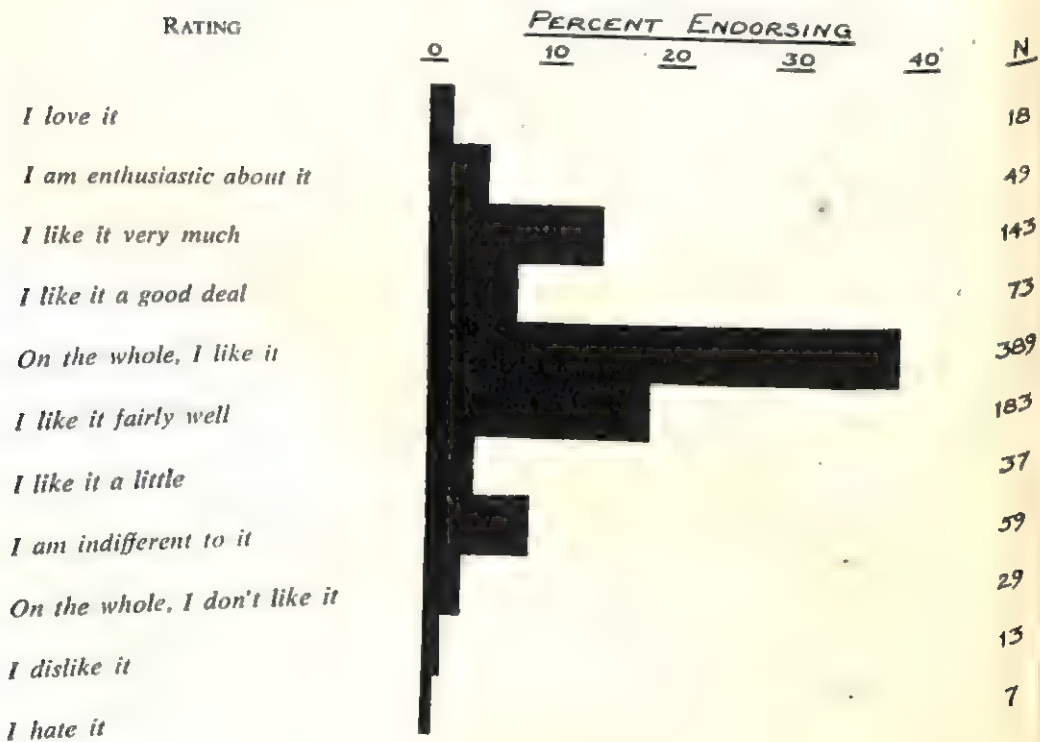
We have made a number of approaches to this issue of non-response. For example, in the questionnaire we ask for details of age, sex, and length of service, and we can therefore compare the distributions of these variables for the respondent population with the distributions for the whole population of employees—which, with luck, we can get from the firm's personnel records. On the whole this method of analysis has not given us much positive information. In some firms men have higher response rates than women, in other firms the reverse happens. Usually there is a reduction in the response rate with age and this may be important. Usually one gets a low response rate from people with very short service with the company, and not invariably so.

One technique that we tried, which is, I think, original, was to include as the final item on the questionnaire a scale which was intended to estimate the subject's keenness to answer, the idea being that one could, by this means, look at relationship between job-satisfaction and keenness to answer and extrapolate from the data through the range of "very keen" to "don't mind one way or the other" and so get an estimate of what the non-respondents would have said about their satisfaction had they been persuaded to reply.

At this point I think it would be best for me to present some of our results, in diagrammatic form.

First of all, here are the frequencies of endorsement of the various alternatives in the "overall job-satisfaction" scale of the questionnaire.

FIGURE 1: OVERALL JOB SATISFACTION RATINGS FOR A SAMPLE OF 1,000 EMPLOYEES FROM FIVE FIRMS



As you will see, the alternative "On the whole I like it" attracted 38.9% of the ratings and the distribution is rather badly at variance with the normal curve, but it does give a reasonable amount of discrimination nevertheless. We did try an experiment in one firm of presenting this scale in two ways: version A had "I love it" at the top, and "I hate it" at the bottom, version B was A upside down. The two versions were distributed alternately to the employees in one factory. 115 of version A were returned and 123 of version B. The distributions (once B was turned the right way up again) were practically identical. There was a very slight tendency for people to endorse nearer the top of the scale, but the difference was nowhere nearly statistically significant. In fact if one uses bi-serial r as a measure of the relationship between the order of the items and the level of satisfaction recorded, the correlation was only .062 for 238 cases.

I will be reporting a number of analyses for this sample of 1,000 people, so I had better tell you a little more about it. Rather than carry out the full analysis of the data from all the questionnaires we had collected, we decided to limit ourselves to using a sample from five firms for the very full correlational analysis of the internal relationships amongst questionnaire items.

The subjects consisted of 1,000 employees of five firms, working in nine factories. The sample was drawn from a total of 4,000 employees in these firms who had answered questionnaires during surveys carried out in 1959 and 1960.

The sampling method was arranged so that the proportions of men and women should be the same as in the whole 4,000, the proportion of office workers should be the same as in the whole 4,000, and as far as possible each firm should be represented by an equal number of subjects.

The resultant sample had the following characteristics:

<i>Firm</i>	<i>Industry</i>	<i>Men</i>	<i>Women</i>
A	Packaging	100	34
B	Electrical engineering	150	34
C	Food	80	34
D	Mechanical engineering	150	34
E	Mechanical engineering	150	34
All firms	Office workers	100	100
Total		730	270

Within these quota limits questionnaires were selected by random numbers.

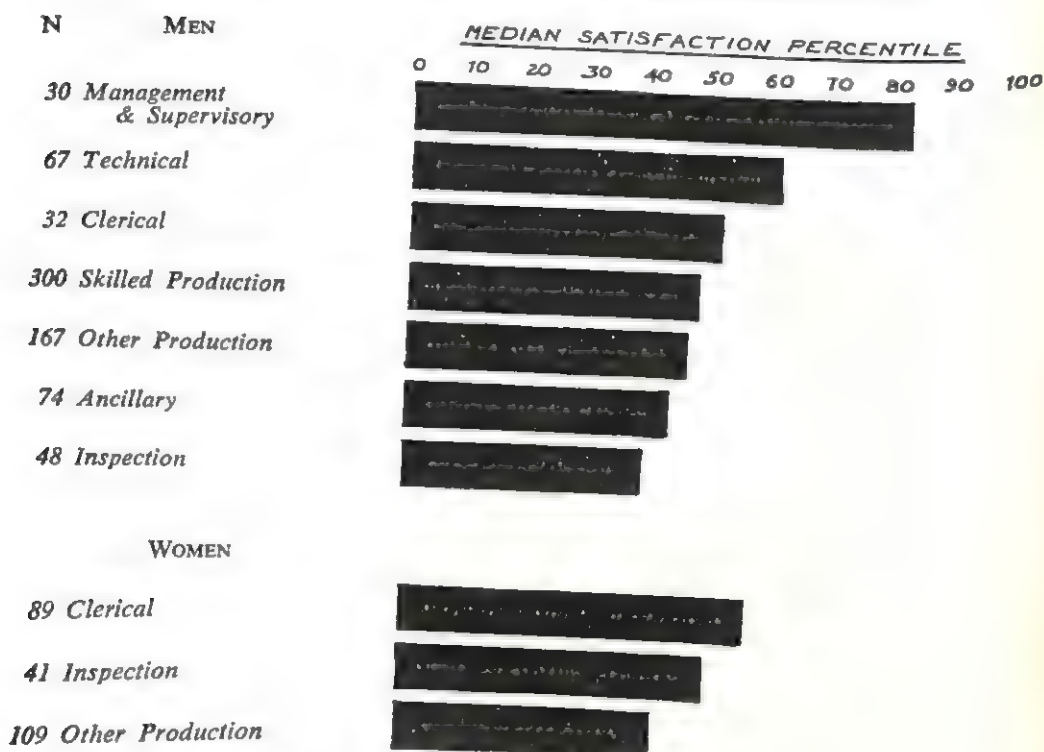
The resultant weighted response rate for the sample was 59%; that is, we had obtained completed questionnaires from 59% of the people concerned.

One other point I need to explain is the 'Median Percentile' technique, of which we have made fairly extensive use. I have borrowed this method

from the writings of Louis Guttman (1950) who used it in connection with his 'Intensity Analysis' procedure. In brief, it is a simple and convenient method of converting measures of central tendency from scales of differing lengths into a simple and directly comparable numerical form, and if you have not come across it before I commend it to your attention as a means of presenting survey results.

Here, for example, are the results of comparing the job-satisfaction ratings of people, from our sample of 1,000, who were in different types of job.

FIGURE 2: MEDIAN SATISFACTION IN DIFFERENT JOBS



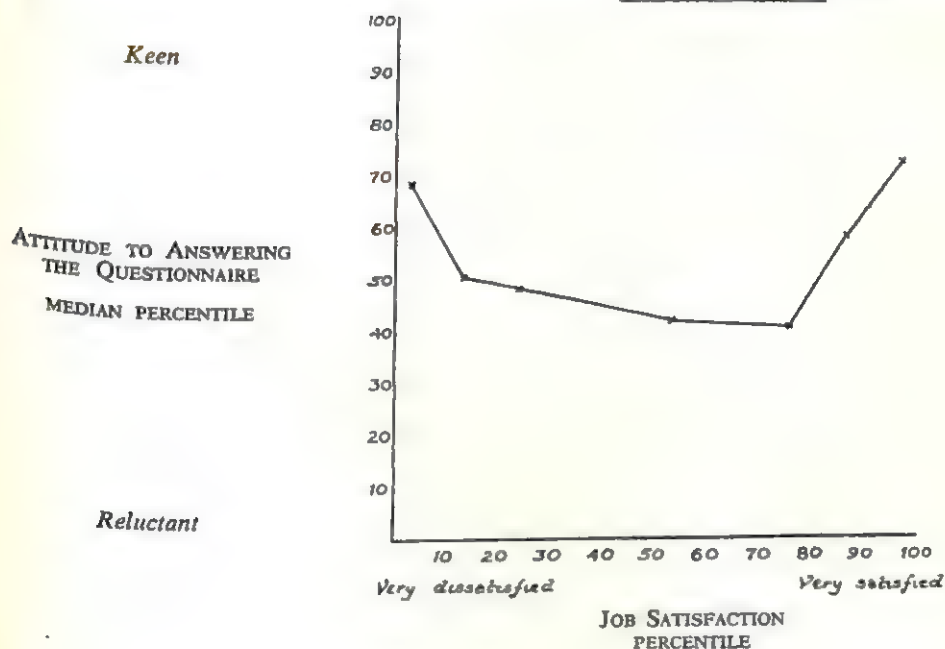
(Based on a sample of 1,000 employees from five firms)

Now, to return to this matter of non-response. As I said, we embodied into the questionnaire a scale intended to measure 'keenness to answer the questionnaire' in the hopes that we would be able to extrapolate to estimate the sort of bias that non-response was producing.

Here are the results for 586 people from our 1,000 sample; unfortunately the idea of using this technique did not occur to us until we had carried out surveys in two of the firms in the sample.

FIGURE 3:

JOB SATISFACTION AND ATTITUDE
TO ANSWERING THE QUESTIONNAIRE
DATA FROM A SAMPLE OF 586 EMPLOYEES
IN THREE FIRMS



The graph uses the median percentile technique for both variables, and is in fact the regression line for satisfaction on attitude to answering. (It should be noted, however, that this relationship is not an immensely strong one, Eta being .2341 and .0615.)

This curvilinear relationship has occurred in each of the firms where we have used the method, and I think the interesting thing about it is that it is curvilinear. It looks as if non-respondents are most likely to be moderately satisfied, and that the people who do answer most readily are those at both extremes for satisfaction. We had a certain amount of other evidence which tended to support this interpretation. For example, in the firm where we got the very low response of 25% the distribution of satisfaction ratings was much less leptokurtic—that is, having a tall narrow peak—than those we have obtained from firms with higher response rates. This suggests, of course, that the non-respondents were people who, if they had answered, would have piled up their satisfaction ratings in the regions of moderate satisfaction. However, I will come back to this point in a moment or two.

Before leaving these graphs I would like to go back for a moment to what I said about the comparisons we were able to make between the age, sex and length of service distributions for our respondent populations in comparison with the distributions for the total employees in the firms concerned. Clearly if those characteristics—age, sex, length of service—are strongly related to satisfaction, then this analysis is likely to be important.

However, we did not find that the relationships were either strong or simple. As far as sex was concerned, the mean job-satisfaction ratings for men and women in our 1,000 sample were virtually identical—but the distributions were different—the standard deviation of satisfaction ratings for women was only 85% of that for men—a difference which is significant at well beyond the 1% level.

As far as age and length of service were concerned, both showed only weak relationships with satisfaction, and the median percentile method of looking at the data shows that both relationships were curvilinear.

FIGURE 4:

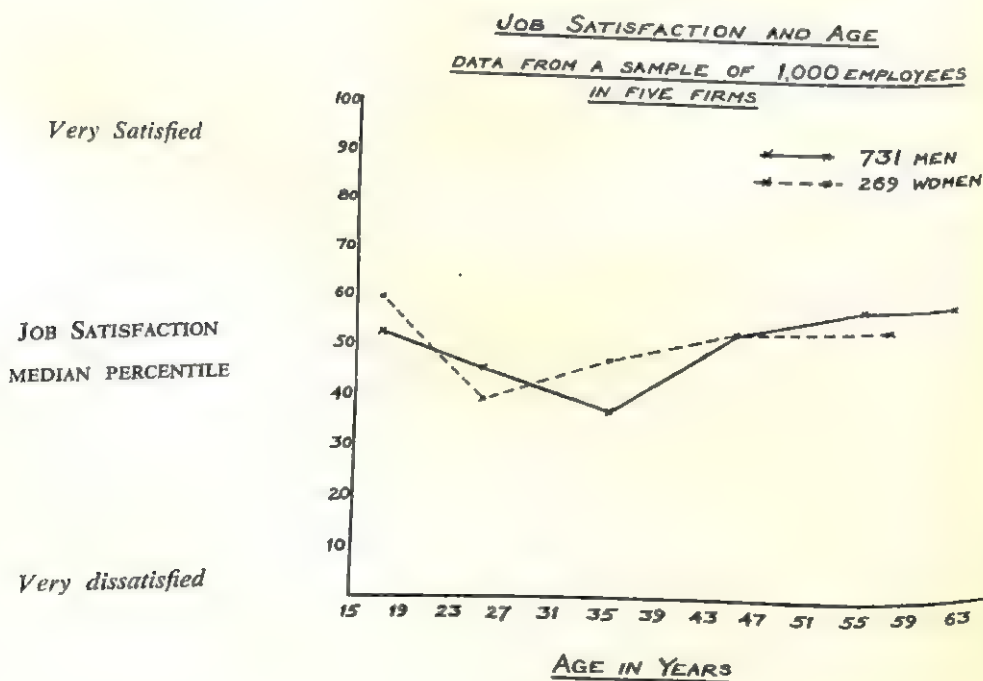
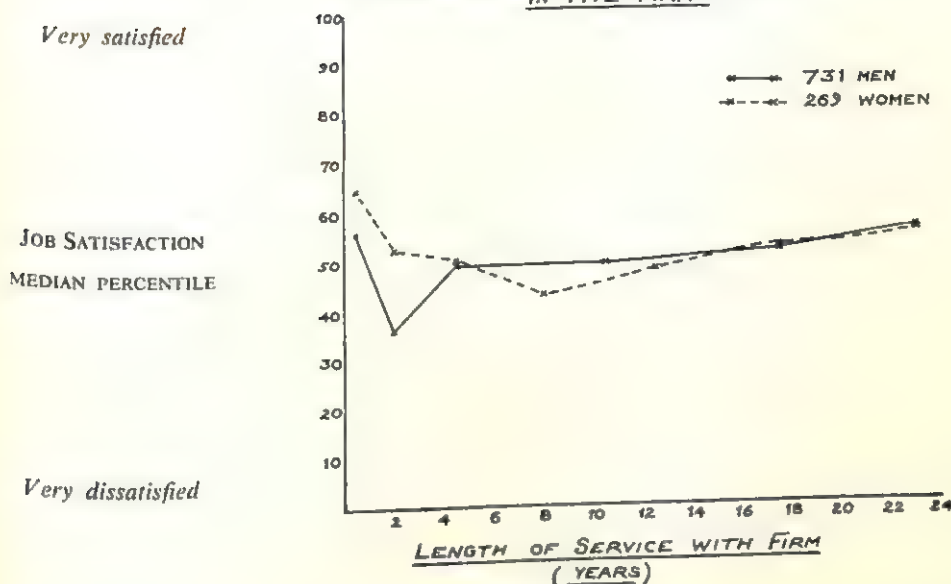


FIGURE 5:

JOB SATISFACTION & LENGTH OF SERVICE
DATA FROM A SAMPLE OF 1,000 EMPLOYEES
IN FIVE FIRMS



While therefore I think one should continue to make comparisons between the age, sex, length of service distributions for respondents and total employees, I doubt whether this will by itself tell you very much about the sorts of bias—as far as levels of satisfactions are concerned—which are likely to arise through non-response.

I would now like to turn to evidence on this issue from another experiment we were able to carry out. Perhaps 'experiment' is a somewhat pretentious title for what we did, because this was a piece of field-work and our controls on the situation were rather seriously lacking in rigour in some respects.*

What happened was that in one of the firms where we had carried out a questionnaire survey and had got a response rate of 51%, we were given the opportunity to carry out individual interviews with a sample of employees, and to get them to answer some of the identical questions that we had asked in the questionnaire survey.

We had two main aims in doing this enquiry: (i) we were a bit worried about drawing conclusions on the basis of a 51% response, and (ii) we hoped that the interviews would throw more light on some of the results we had got in the questionnaire survey; in particular we wanted to ask people in more detail how they felt about certain issues, and thus to check

* A fuller account and discussion of this will appear later in a paper by Brian Bartlett and Philip Limb.

on the interpretation (or different interpretations) that they might have placed on the questions used in the questionnaire.

The main weakness of the experiment was that the interviews were carried out six months after the questionnaire survey, but we had reason to suppose that relatively little had occurred in the firm in the meantime which was likely dramatically to affect employees' job-satisfaction. Two other shortcomings should be mentioned; first, only 81% of those invited to attend interviews in fact actually did so, so even the interview results are likely to be affected by a non-response bias; secondly, despite the fact that 45 minutes was scheduled for each interview, it was not possible in that time to cover anything like as much ground as the questionnaire attempted, albeit superficially, to cover. In fact, two psychologists were occupied for four weeks in carrying out these 200 interviews, and it took them rather longer again to analyse the data they had obtained and prepare their report. I think this reinforces my comment on the speed and relative cheapness of the questionnaire method!

The names of people to be invited for interview were selected by random numbers from the nominal rolls of the Company. They were asked whether a certain time would be convenient and were given an explanation of the purposes of the interviews. As I said, only 81% of those invited actually did turn up, and names continued to be drawn until each interviewer had seen 100 people. We carried out the usual comparisons of differences between interviewers in what they recorded their subjects as saying, and we got no significant differences between interviewers on any question. Incidentally, I should say that when we tried to find the reasons for non-attendance at interviews by going and finding the people concerned and asking them why they did not accept their appointment, the most frequent reasons were 'too busy', 'not interested', or 'nothing to add to what I said on my form'.

Broadly speaking, the interviews had two parts. In the first we adopted a rather rigidly controlled procedure in which the interviewer asked questions in the identical form that they had occurred in the original questionnaire, and in fact presented the subject with a card on which the question was typed together with the appropriate alternative responses. The second part was informal and unconstrained, in which subjects were just encouraged to talk about their earlier replies and to elaborate on any other points they wished to make.

Amongst the questions asked at the interview were: "Did you get one of these questionnaires?", "Did you fill it up?", "Did you hand it back?". We were therefore able to divide our interview population into 'questionnaire survey respondents' and 'non-respondents'. Happily, the proportions we obtained were just about right, 54% of interviewees claiming to have answered questionnaires.

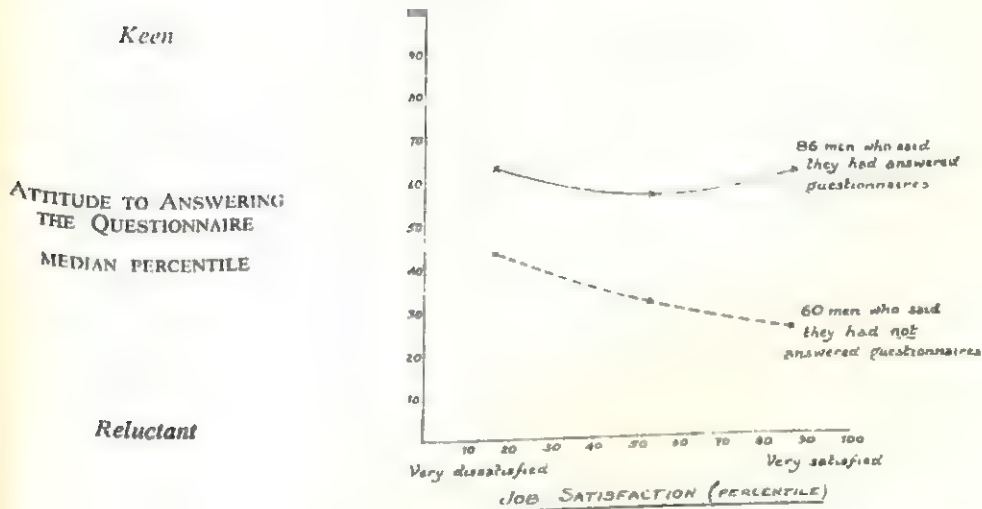
On the basis of the evidence from the curvilinear relationship between the scale of 'keenness to answer' and satisfaction we anticipated that the

subjects who at interview said they had not answered questionnaires would have a similar mean level of satisfaction to those who said they had answered, but that the standard deviation of the satisfaction ratings of 'non-respondents' would be less than the standard deviation for respondents. In fact, however, while the mean satisfaction ratings for the two groups were, as we had anticipated, very similar. The median rating for the 'non-respondents' was only 1.8 percentile points higher than for the 'respondents', and the standard deviation of the satisfaction ratings for 'non-respondents' was 8.2% greater than that for 'respondents'. Of course, the numbers were small—only 109 respondents and 91 non-respondents, and the difference is nowhere nearly statistically significant—nevertheless it is in the opposite direction to what we had expected.

This was a pity! We looked at the data a little more closely and examined the relationship between 'keenness to answer' and satisfaction for our respondent and non-respondent groups separately. The result was as follows:

FIGURE 6:

JOB SATISFACTION & ATTITUDE TO ANSWERING OF
RESPONDENTS AND NON-RESPONDENTS
(Data obtained by follow-up interviews)



As you will see, the relationship was different for the two groups. It is a relief to see at least that the non-respondents rated themselves as less keen to answer: in fact, this single item differentiated respondents from non-respondents to the extent of a bi-serial correlation of .50. But it is apparent that the non-respondent group included a substantial proportion of fairly highly satisfied people who had a rather negative attitude to the questionnaire survey. Further examination of the data suggested—but the size of its

sub-groups was getting too small for adequate analysis—that these people were predominantly elderly, and included more than their share of managerial and supervisory grades who had felt that the questionnaire was not intended for them but was for their subordinates.

So much then for our evidence on the effects of non-response. Now I would like very briefly to present some evidence on the 'validity' of the questionnaire answers. Validity in this context is a difficult issue, and all I propose to do is to give some data about the comparability of evidence derived from questionnaire and interview methods.

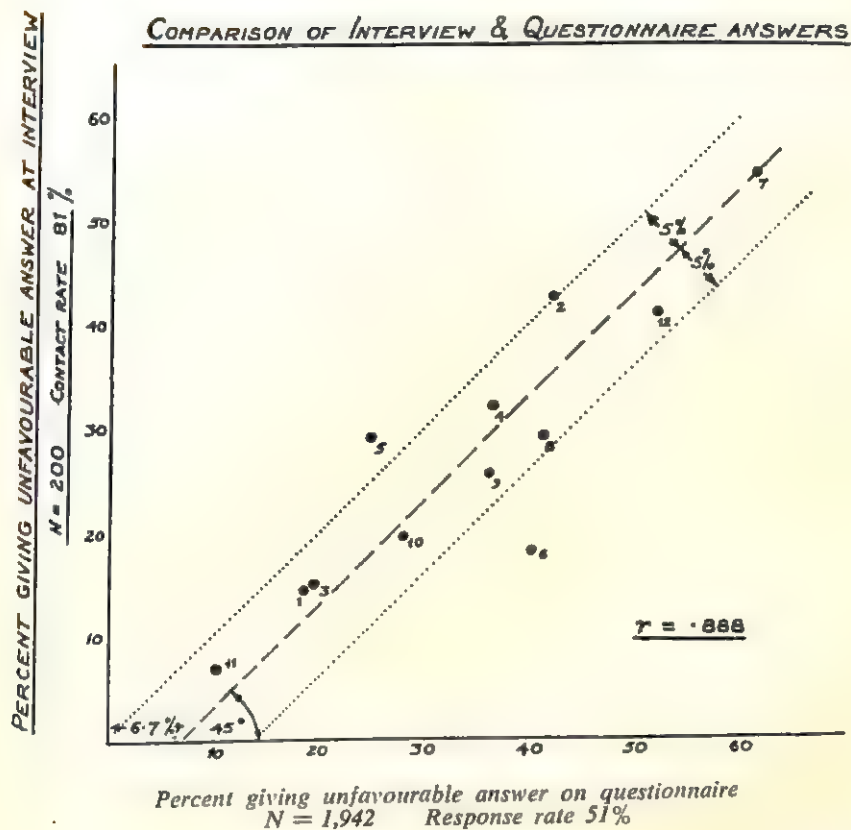
THE COMPARABILITY OF INTERVIEW AND QUESTIONNAIRE RESPONSES

As I said, in the experiment where we carried out 200 interviews as a follow-up of a questionnaire survey, the interviewers repeated 12 items from the questionnaire and offered their interviewees the previous alternative replies to choose from. In Figure 7 I have shown the plot of the percentages giving the unfavourable answer to each question for the questionnaire survey (horizontal axis), against the interview survey (vertical axis). The numbers beside the dots identify the questions concerned, they were:

Question

1. Do you think the job you are in is the right sort of job for you?
2. Have you ever thought seriously about changing your job?
3. Are you doing as well in your present job as you expected to?
4. Is your work often discouraging?
5. Does your work require a lot of concentration?
6. Do you feel free to let the management know how you feel about things?
7. Do you feel you are told enough about what's going on in the firm to keep you in the picture?
8. Are you satisfied with your earnings?
9. Do your earnings depend on too many things you cannot control?
10. Do you get enough change in your work from time to time?
11. Can you take a pause when you feel you need to?
12. Overall Satisfaction Rating (100—Median Satisfaction Percentile).

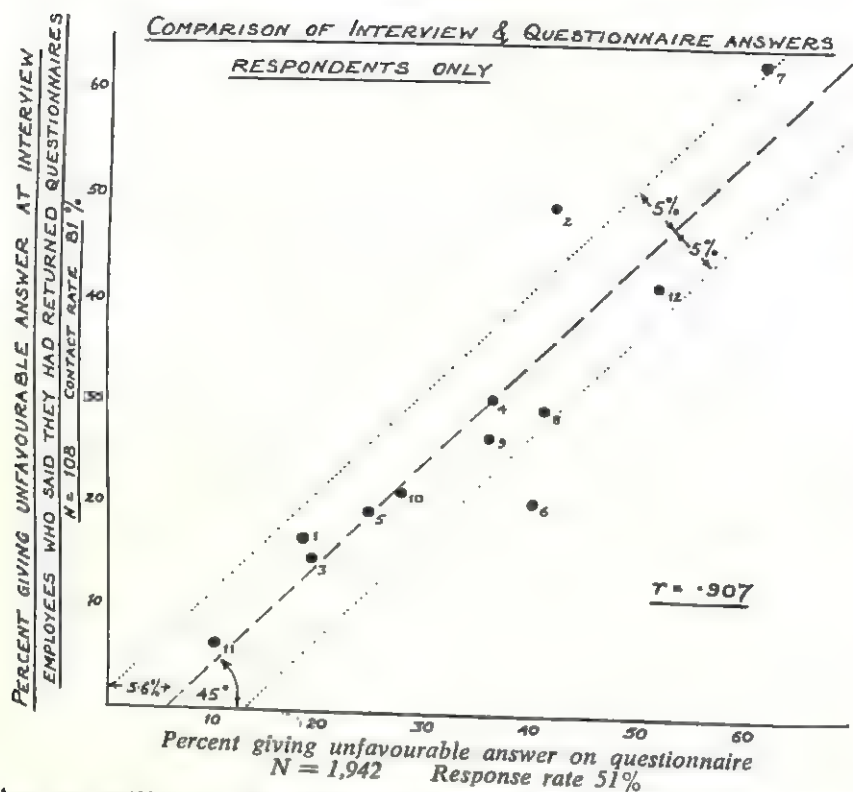
FIGURE 7:



As you will see, the plots approximate to a line at 45 degrees, but offset 6.7% along the horizontal axis; that is, there was on average 6.7% less complaint about each issue at interview as compared with questionnaire.

However, this data relates to *all* interviewees, and to questionnaire respondents only. I therefore also plotted the same display for the data from interviewees who said they had answered questionnaires.

FIGURE 8:



As you will see, the picture is very similar. The offset is now 5.6% instead of 6.7%, but it is still the case that the interviews yielded a higher estimate of satisfaction than the questionnaires.

Although we have to allow for what might have happened in the six-month interval between the two surveys, it seems a reasonable assumption that this upgrading is at least in part an 'interview effect', and indeed the literature generally supports this view.

That about completes what I want to say about the limitations of the questionnaire technique—due to non-response, and to its reputation of dubious validity. At least I think we can say that in our experiments the results of interviews and of questionnaires are not wholly dissimilar!

Having thus, I hope, indicated that the questionnaire method may be not altogether misleading, I would like to turn to some evidence about the dimensions of job-satisfaction which we have derived from factor analytic studies of the internal relationships amongst responses to questionnaire items.

THE DIMENSIONS OF JOB-SATISFACTION

There are a number of points of importance on this issue; for example:

- (i) How far are measures of job-satisfaction measures of something about people's specific adjustment to their jobs, or are they more a measure of general satisfaction with life?

- (ii) If they are not—to an overwhelming degree—measures of generalised satisfaction with life, but are fairly strongly related to occupational aspects of adjustment, how many separate elements—or factors—are present in this concept of occupational adjustment.
- (iii) Most studies suggest that the 'general factor' in job satisfaction is fairly prominent, and that the group factors are relatively small in comparison. Is this due to a genuine unitariness in job satisfaction, or is it due to an artifact in the method of measuring satisfaction?

We have a certain amount of evidence to offer on each of these points.

First then, what is the evidence about the issue of whether 'job-satisfaction' questionnaires measure specific occupational adjustment rather than general adjustment to life? Our method of tackling this, as a first step, was to introduce into the questionnaire a number of items which we thought were likely to tap neurotic maladjustment—our hypothesis being that, if only one factor was required to account for the variance on both the neurosis and the job satisfaction items, then the questionnaire was not measuring specific occupational adjustment.

We had, of course, to choose neurotic detectors which did not look too out of place in a questionnaire purporting to be about how people felt about their jobs, and we finally ended up with the following:

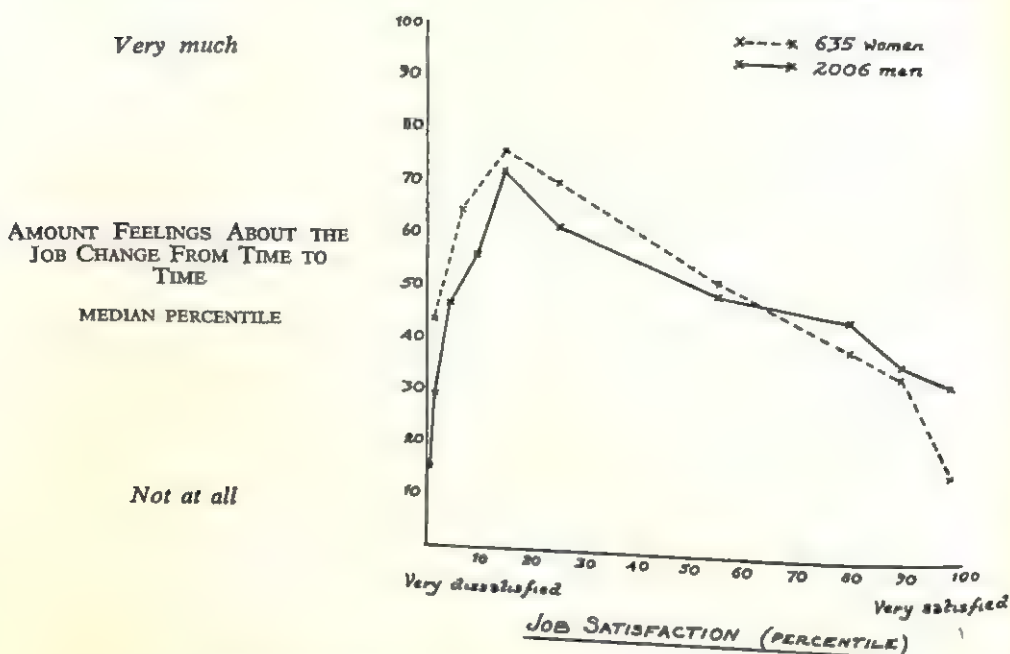
- (i) Does your work ever upset your health much?
- (ii) Do you feel too much 'hemmed-in' by your work?
- (iii) Do you ever get eyestrain from your work?
- (iv) Does your work tire you out too much?
- (v) Are the people who work near you friendly?
- (vi) Do you ever get bad headaches from your work?
- (vii) Would you regard yourself as nervous and highly-strung?

We then carried out factor analyses of the correlations between these items and a number of obviously 'job-satisfaction' items, for two separate populations—(i) 295 male factory workers, and (ii) 249 female factory workers. The results were very similar for the two sexes, and showed that three factors were needed to account for the variance. These were a 'neurosis' factor, a job satisfaction factor, and a 'health' factor. The loading of the key job-satisfaction item on the neurosis factor was $-.186$ for the men, and $-.100$ for the women. Russell Fraser (1947) quotes figures which can be converted to correlation coefficients of the relationship between job-satisfaction and neurosis for his sample of 1,446 men and 1,448 women, the results being $-.192$ for men and $-.160$ for women.

On this evidence, therefore, we felt we had grounds for holding that the hypothesis that job-satisfaction questionnaires measure general adjustment to life was false.

The second issue, how far is job-satisfaction a single factor rather than a cocktail of relatively differentiated component satisfactions was our next problem. I have one, I believe novel, piece of evidence to offer here.

FIGURE 9: JOB SATISFACTION AND VARIABILITY OF FEELINGS ABOUT JOB



This is by way of being a fact in search of an explanation rather than an explanation of a fact.

What we have done here is to plot people's ratings of how much their feelings about their jobs vary from time to time, against their ratings of their job-satisfaction. When this is done one finds this marked curvilinear regression. Highly satisfied and highly dissatisfied people report little or no variation, but the moderately dissatisfied report a lot of variation. The explanation of this that I am inclined to offer is that for the bulk of people, and particularly for those who are fairly dissatisfied, job-satisfaction is a dynamic process of balancing one thing against another, rather than a static process of having a particular level of all-over satisfaction.

This finding may be at least a partial explanation of the difficulties which people have found in trying to make use of 'exit-interviews' to obtain information about what is causing labour-turnover. It may well be the case that the feelings of the people who are on the point of quitting are in a state of turmoil, and that even with the best will in the world they cannot explain how they feel, or what was wrong in their job.

The remaining material on the dimensions of job-satisfaction—since I offer the above as evidence of its multi-dimensional nature—is somewhat difficult to present briefly, so I have given the full data as Appendix II. What we did was to take our sample of questionnaires from 1,000 people, pick out all the items where the population was divided into groups with less extreme splits than 10%–90%, intercorrelate answers and factorise the resultant matrix. We did this as a two-stage procedure for two reasons:

as a one-stage procedure it would have involved the computation of 4,753 correlations, whereas the two-stage method required only 1,555, which is a considerable saving when each correlation is based on 1,000 cases; secondly, we recognised that the rotation of the factors from the one-stage method would be an enormously difficult problem. It was bad enough in the two-stage method! The use of the two-stage method, however, involves a weakness in that we found it practicable only to use unit-weight scoring to obtain the first-order factor scores; this does reduce the accuracy of our results, but we have attempted to overcome this to some extent by scoring for a spurious factor created by the unit-weight scores, and extracting this factor in the second-order matrix.

The results of this work suggest that there are at least ten relatively independent factors underlying the pattern of correlations we obtained:

- (1) A factor which arises from the method used in the questionnaire to tell subjects how to record their answers, and from the adoption of unit-weight scoring.
- (2) Satisfaction with supervision.
- (3) Physical working conditions.
- (4) Satisfaction with pay.
- (5) Evaluation of the firm.
- (6) Residual variance in 'overall job satisfaction' not accounted for by the other factors.
- (7) Intrinsic interest of the work.
- (8) Undemanding character of the work.
- (9) Leniency of discipline in the firm.
- (10) Health stress.

(See Appendix II for details of the factor loadings.)

No doubt, had we used different items in the questionnaire the identities of the factors we would have obtained would have been different, but it seems plausible to argue from these results that job-satisfaction is multi-dimensional in character.

Thus I feel that the evidence we have obtained strongly supports the view that studies of attitudes to work and job-satisfaction should use a multi-factor framework, and in particular that if one seeks to investigate, for example, relationships between satisfaction at work and efficiency at work, one should be pretty explicit about which aspects of job-satisfaction one is correlating with the efficiency measures.

THE DIMENSIONS OF ASPIRATIONS

I must now turn very briefly to the second item in the title of my paper. What I have to say here is very much a workshop report of studies in progress.

Presumably if one is to have an adequate theory of job-satisfaction one must take account not merely of the satisfaction of appetites, but also of the nature of these appetites and of individual differences in their pre-potency.

Rightly or wrongly, I took it to be the case when we started work on this enquiry that there was relatively little published in the way of systematic studies of the dimensionality of human occupational aspirations. There are of course numerous studies in which workers have been asked to rank the relative importance to them of such things as pay, hours, interesting work, and so forth, but I found myself very dissatisfied with what appeared to me to be serious methodological and theoretical shortcomings in these studies.

I felt therefore that we ought to try and start pretty well from scratch, and attempt to approach the problem by a number of different methods, to see whether the results from the different approaches tended to support or to contradict each other. In fact, however, our work has so far been confined to only two methods of investigation.

Both of these are open to the very reasonable objection that all we have done is to study what people *say* about their aspirations, and that we have not studied what they actually do in the way of striving towards goals.

While I agree that the latter is, of course, the behavioural issue of real consequence, I do not agree with those critics who dismiss studies of what people say as trivial. Indeed, it seems to me that semantic studies are a necessary precursor to any adequate behavioural studies.

When we started thinking about the problem of investigating systematically what people said about their aspirations, we ran up against a serious problem—to wit, how does one draft questions which are appropriate for a whole range of people from widely dissimilar social, educational, and occupational backgrounds?

One idea that occurred to us was to use 'personality' items with instructions of the type, 'How attractive is this to you?' This led us to the development of one of the questionnaires on which we have done a considerable amount of work; it is shown as Appendix III and is headed 'Which would you prefer to be?' I have not time to go into details of the way in which the forced-choice pairs were constructed; there was a quite reasonable rationale, and we developed a method of correcting the correlation matrix of 32×32 items to allow for the effects of the forced choice pairings.

In parenthesis I should say that after we had produced this version and gathered replies from our first wave of respondents we had some second thoughts, and felt we ought to have included items to attempt to tap two areas of self-evaluation that we had omitted—these being the desire to be 'sensible, down-to-earth, practical', and the 'gay, lively, cheerful' area. However we felt that it would be too big a task to start over again to include these, and we continued work on the originally formulated version.

Somewhat to my surprise, people were willing to answer this unreasonable looking document, and reported completion times in the region of 10 to 20 minutes.

By various means and with the help of personnel managers in a variety of firms we collected several hundred completed questionnaires, from which we selected a sample of 500 which were an approximate quota sample of

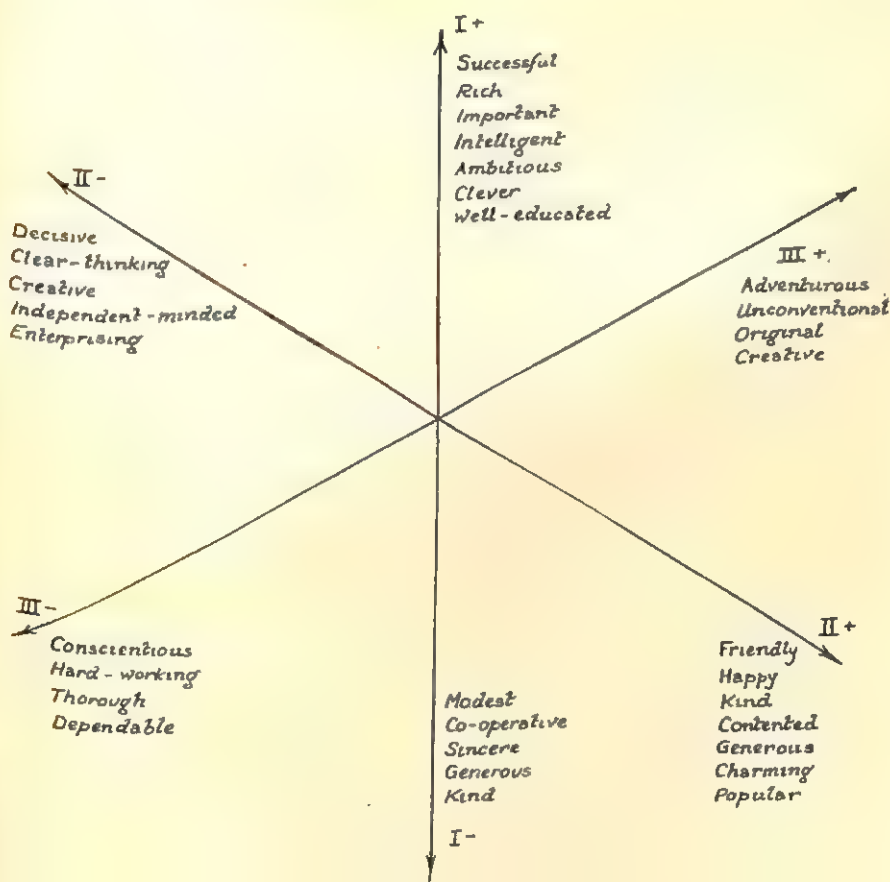
the employed population by age, sex, occupational level, and heavy, light or service industry.

We carried out a number of analyses of the resultant material with the aid of the University of London Computer Unit. For example, there are strongly marked sex differences in the attractiveness of the various words, 14 of the 32 words showing differences significant at the 0.1% level. Nevertheless the rank orders of attractiveness of the words are pretty similar, rho being +.824 for the two sexes. Again, we looked at age differences, and at least one of these seems interesting—older people choosing 'conscientious' and 'thorough' markedly more than younger ones.

We also factorised the matrix of 496 correlations between the 32 items and at the moment I can report the results of rotation of the first four factors which, in their rotated form, account for 15%, 13%, 8% and 7% of the variance, i.e., a total of 43%. I think there are probably more factors to come out, and this may tidy up the picture, but we are waiting for computer time to complete this analysis.

FIGURE 10:

DIMENSIONS OF THE "DESIRED SELF"



This is intended as a three-dimensional picture of the first three factors, which account for 36% of the variance. As you will see, they appear to be psychologically meaningful, and indeed Factor I which contrasts desire to be 'worldly successful' with desire to be 'modest and good' brings to my mind the work of Porter and Ghiselli (1957).

The other approach which we have used on a relatively substantial scale has been the collection of unstructured material—to wit, essays by school-leavers on "What I want from life and from my job". Three samples, each of about 100, of these have so far been content analysed and the themes which appeared have been scored for presence or absence in each essay, and the resultant matrices factor analysed. In each case the first factor to appear has been one which we feel can reasonably be identified as the 'worldly-Success *vs.* modest and good' factor obtained in the study with the 'Desired Self' questionnaire.

I regret that time does not permit me to comment more fully on this work, but as I said at the start, this has been intended as a progress report on some of the work we have been doing. I trust that you have found it of some interest, and that those of you who are concerned with these sorts of problems have gathered sufficient from what I have been able to say to enable you to decide whether or not these contributions have any relevance to your own studies.

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APPENDIX I

HOW DO YOU LIKE YOUR JOB?

You may have heard that some research is being carried out at (Name of firm) on how much people like their jobs.

It would be of great value to the research if you would fill up this form about how *you* feel about *your* job. There is room at the end for you to write any special comments you want to make.

You need not give your name, if you don't want to, but the completed forms will not be seen by anyone except the staff of the National Institute of Industrial Psychology.

-
1. I have been in my present job.....years.
 2. I have worked at (Name of firm) for.....years altogether.
 3. How many firms, apart from (Name of firm) have you worked for in the last three years?firms.
 4. My job is
(e.g., machine minder, supervisor, maintenance engineer, fitter, quality control, typist, or whatever your job is usually called).
 5. My age is.....years.
 6. I am male/female (cross out which does not apply).
 7. I work full-time/part-time (cross out which does not apply).
 8. Now consider all the things that are part of your job: the actual work, the pay, the conditions of heating, lighting and ventilation, the way you are supervised, the people you work with, and so on, and then put a tick (✓) beside the *ONE* statement that most nearly describes the way *you* feel about *your* job:—

I love it
 I am enthusiastic about it
 I like it very much
 I like it a good deal
 On the whole, I like it
 I like it fairly well
 I like it a little
 I am indifferent to it
 On the whole, I don't like it
 I dislike it
 I hate it

9. Your feelings of satisfaction with the job may change from time to time. Please tick the item in each of the two following lists which best describes the way your feelings change.

How much they change

Very much
 Quite a lot
 A fair amount
 A little
 Not at all

How often they change

From hour to hour
 From day to day
 From week to week
 From month to month
 Hardly change at all

o. What are the things you like best about your job?

.....

ii. What are the things you dislike most about it?

.....

I. Here are some phrases which can apply to jobs. Please read through this list and tick (✓) those statements which seem to fit your job. You can use as many or as few ticks as you like.

a steady job	needs nimble fingers	boring
monotonous	too routine	you have to concentrate
responsible	dirty	varied
competitive	worrying	too fast
clean	too heavy	the product is ugly
damp	well paid	badly organized
difficult	irritating	too tiring
I work with a good crowd	good equipment (machines)	skilled
straightforward	noisy	good work hours
the product is interesting	I work on my own	cluttered up
payment by results	artistic	interesting
not enough skill required	keeps you busy	uses your brains
too much waiting around		too mechanical

I work with those of my own age you can pause when you want to
 offers prospects of promotion gives you a chance to use initiative
 my work is slowed up by other people's mistakes

Any others?

II. Here are some statements that can apply to "the boss". Please read through the list and tick those which apply to *your* boss (that is the person you think of as most directly in charge of your work).

fair	reliable	muddled
strict	helpful	respectable
expects too much	nagging	pleasant
considerate	full of ideas	always keeps promises
stand-offish	too old	encouraging
efficient	good to work under	explains things clearly
moody	confident	frightening
knows his job	breathes down your neck	has favourites
clever	praises you when you do	interfering
too young	well	kind
listens to what you say	sarcastic	stands up for us
sincere	doesn't seem interested	slack
		swears at people
we can never find the boss		you never know where you are with him (her)
not clear who the 'boss' is		treats you like a human being

Any others?

III. Here are some statements about firms. Please tick those which you feel apply to your firm.

friendly	enterprising	has safe markets
up-to-date	too set in its ideas	well run
a good firm to work for	hardworking	poor working conditions
has a good reputation	"a happy family"	offers well-paid jobs
old-fashioned	only out to make money	too big
difficult to get to	offers secure jobs	scruffy
honest	serves its customers well	good welfare
"go-ahead"	efficient	poor planning
ruthless	losing money	mean
unhappy	has a nice class of worker	too departmentalised
changing	too much class distinction	respectable
muddled	impersonal	strict about timekeeping
		easy-going

not enough overtime
looks after its employees well
trade unions given too much power
needs some fresh people at the top
too many people in the offices
not enough training provided

too much overtime
they waste money on things we don't want
good cooperation with trade unions
too many rules and regulations
makes a good class of product
there is a good suggestion scheme

Any others?.....

After each of the following questions draw a circle round "Yes" if the answer is "Yes". Draw a circle round "No" if the answer is "No". Draw a circle round "?" if you are not sure. Leave it blank if you find the question too difficult to answer.

	Yes	?	No
1. Are the materials you use generally satisfactory?	
2. Is your machine (equipment) usually kept in good working order for you?	
3. Is your job too monotonous?	
4. Are you often delayed by waiting for work?	
5. Are you doing as well in your present job as you expected to?	
6. Have you ever thought seriously about changing your job?	
7. Does your work tire you out too much?	
8. Does your work require a lot of concentration?	
9. Can you take a pause when you feel you need to?	
10. Do you feel that you are rushed too much by the speed of the work?	
11. Do you feel you can work at your own speed?	
12. Do you find the time passes quickly?	
13. Is your work often discouraging?	
14. Do you get enough change in your work from time to time?	
15. Do you ever get bad headaches from your work?	
16. Did the firm give you sufficient training for the job you are doing?	
17. Do you feel too much "hemmed-in" by your work?	
18. Do you ever get eyestrain from your work?	
19. Are you satisfied with your earnings?	
20. Do your earnings depend on too many things you cannot control?	
21. Does your work ever upset your health much?	
22. Is there too much noise where you work?	

23. Are there any fumes or smells connected with the work which bother you? ... Yes ? No
24. Would you choose another "boss" (that is the person you think of as most directly in charge of your work) if you could? ... Yes ? No
25. Are you able to chat to people whilst you are working? ... Yes ? No
26. Are the people who work near you friendly? ... Yes ? No
27. Would you regard yourself as nervous and highly-strung? ... Yes ? No
28. Do you feel that you work as a part of a team (rather than on your own)? ... Yes ? No
29. Do you think that the job you are in is the right sort of job for you? ... Yes ? No
30. Do you have too many bosses? ... Yes ? No
31. Is there too much dirt where you work? ... Yes ? No
32. Do you feel free to let the management know how you feel about things? ... Yes ? No
33. Do you feel that you are told enough about what's going on in the firm to "keep you in the picture"? ... Yes ? No
34. How many people work in the same group as yourself? About people. Yes ? No

How good a job do you feel that the various levels of management in the Company are doing?

Please tick *ONE* square opposite to each level to indicate your opinion—leave out any you feel you are not in a position to judge.

	EXCEL- LENT	VERY GOOD	GOOD	FAIRLY GOOD	RATHER POOR	BAD
Foremen						
Department Management ..						
Top Management						

If you would like to say anything else about how you feel about your job, please write it here :

How do *you* feel about filling in this form? Do you think that this survey is a good idea or not? (Please tick the *ONE* answer which most nearly shows how you feel.)

I am very much in favour of it

I am in favour of it

On the whole, I am in favour

I don't mind one way or the other

I don't want to be bothered with it

I am inclined to think it is a bad idea

I am against surveys like this

I refuse to have anything to do with it

You can put your name here if you like.....

Bring this form to work tomorrow—it will be collected by one of the staff of the National Institute of Industrial Psychology in the same way as it was given to you.

That's all. Thank you very much for your co-operation.

B. M. Speak

Industrial Psychologist

APPENDIX II

FACTOR ANALYSIS OF JOB-SATISFACTION DATA

The factor analysis of data from the questionnaires was carried out in two stages. The first stage consisted of the development and analysis of four correlation matrices, concerned respectively with information contained in the check-lists on 'the job', 'the boss', and 'the firm', and from a rather more heterogeneous group of questions which had been presented with 'Yes', '?', or 'No' as the available answers.

ROUTINE OF ANALYSIS

First Stage

The data from the sample of 1,000 questionnaires were transferred to Hollerith punched cards. Within each of the four matrices cross-tabulations of items which had been endorsed by between 10% and 90% of subjects were obtained. (Items with more extreme splits than this had to be excluded because of the limitations imposed by the use of tetrachoric correlations.) These cross tabulations provided 2 x 2 tables which were converted to tetrachoric correlations by means of Thurstone's computing diagrams.

The four matrices were then factor analysed on a Mercury computer with a principal component programme. It was decided to limit the analysis to six factors for each matrix because of the need to limit the computer time devoted to this stage of the work, and because previous small scale trials had indicated that six factors would account for about two-thirds of the total variance.

The resultant factor loadings were then plotted graphically and rotations carried out with the aim of arriving at results which were (a) psychologically meaningful, and (b) which would permit the use of unit-weight scoring methods for the development of factor scores for the second-stage analysis. Sums of squares of factor loadings were compared for the rotated and unrotated axes, and were checked until no discrepancy greater than 1% persisted.

RESULTS

MATRIX OF CHECK-LIST ITEMS ON "THE JOB"

FREQUENCY OF ENDORSE- MENT PER CENT	ITEM	ROTATED FACTOR LOADINGS						h ² (UNRO- TATED)
		I	II	III	IV	V	VI	
57.9	A steady job	000	383	288	-263	-198	419	516
16.3	Monotonous	-779	108	-191	254	017	-221	768
34.6	Responsible	475	547	130	-062	-168	-106	586
27.2	Clean	028	272	833	-049	078	013	780
56.2	I work with a good crowd	079	422	130	190	096	535	528
18.0	Straightforward ..	-295	387	200	041	392	206	477
17.1	The product is interesting	495	502	136	098	135	099	552
10.4	Needs nimble fingers ..	033	388	-010	-008	060	-355	283
10.8	Too routine	-749	200	013	280	-089	-254	750
19.8	Dirty	-256	151	-829	219	-017	116	846
11.0	Well paid	000	351	153	000	620	000	533
14.6	Good equipment (machines)	-054	560	197	-071	307	-109	467
22.9	Noisy	-407	351	-648	-340	125	-068	845
18.6	I work on my own ..	-004	356	132	-427	-206	-240	420
46.9	Keeps you busy	123	547	-056	-081	135	-437	538
13.1	Boring	-733	174	-213	418	053	-158	820
34.3	You have to concentrate	364	540	090	-161	-209	-345	619
21.5	Varied	556	370	-109	-030	-046	082	467
19.6	Badly organized ..	-186	092	-011	890	-230	-029	883
18.4	Skilled	424	552	-143	-013	-421	019	680
29.1	Good work hours ..	059	532	216	-078	278	195	453
30.1	Interesting	688	439	022	000	070	013	672
28.5	Uses your brains ..	614	638	-010	-008	-173	-073	814
25.3	I work with those of my own age	-120	433	-164	-020	022	500	482
42.4	You can pause when you want to	-107	467	247	-297	-234	467	650
18.7	Gives you a chance to use initiative	573	401	000	-222	-149	080	568
* 28.3	Satisfaction Dichotomy I	676	000	100	-210	556	126	838
* 67.0	Satisfaction Dichotomy II	686	023	158	-270	427	204	796
	Percent of Total Variance	18.97	16.19	8.40	6.71	6.36	6.32	62.95

* (The two items Satisfaction Dichotomy I and II refer to subjects endorsement of the 'Overall Satisfaction Scale'—i.e. an eleven point rating scale of general satisfaction with their jobs—this was dichotomised first between "I like it a good deal" and "On the whole I like it", thus contrasting more satisfied respondents with the remainder; and secondly between "On the whole I like it" and "I like it fairly well", thus contrasting the less satisfied respondents with the remainder).
The factor-loadings printed in bold face indicate items selected for unit weight scoring to provide factor scores.

INTERPRETATION OF THE FACTORS

Factor I is clearly Interest vs: Boredom.

Factor II has relatively even all-positive loadings on all items except the two Overall Satisfaction Dichotomies, on which it has zero loadings. It has therefore been interpreted as a measure of the subjects' tendency to endorse either few or many items in total. The factor score derived for this factor is simply the total number of items endorsed.

Factor III is clearly Clean work vs: Dirty and Noisy Conditions.

Factor IV has only one large loading—Badly organized.

Factor V also has only one large loading—Well paid.

Factor VI contrasts 'Needs nimble fingers', 'Keeps you busy', and 'You have to concentrate', with 'A steady job', 'I work with a good crowd', 'I work with those of my own age', and 'You can pause when you want to', and has therefore been called "Demanding vs: Undemanding".

MATRIX OF CHECK-LIST ITEMS ON "THE BOSS"

FREQUENCY OF ENDORSE- MENT PER CENT	ITEM	ROTATED FACTOR LOADINGS						h ² (UNRO- TATED)
		I	II	III	IV	V	VI	
25.6	Treats you like a human being	560	587	160	-050	-200	-026	727
25.9	Considerate	568	398	474	010	-242	-123	776
35.2	Good to work under ..	578	383	483	122	-213	-018	781
45.9	Fair	634	299	180	-118	-024	-292	622
26.5	Pleasant	475	473	384	057	-191	363	765
30.7	Helpful	475	465	468	041	-156	135	704
34.2	Listens to what you say ..	560	398	401	-025	032	-248	688
10.5	Praises you when you do well	378	701	057	178	117	160	703
15.5	Stands up for us ..	401	540	347	041	-092	-194	629
14.3	Sincere	450	417	564	050	-108	118	716
31.5	Respectable	277	547	417	120	-231	290	695
18.2	Explains things clearly ..	350	427	625	070	-198	-034	744
20.3	Efficient	398	301	640	020	-073	-024	658
16.6	Reliable	360	398	702	053	-090	233	847
11.2	Always keeps promises ..	314	492	633	063	078	-138	767
11.7	Confident	130	530	690	101	-061	132	799
38.3	Knows his job	198	230	795	158	-049	000	748
10.4	Full of ideas	040	373	547	097	585	103	799
20.1	Moody	-697	312	-254	-047	053	-383	799
14.1	You never know where you are with him ..	-780	245	-363	042	-002	056	811
18.9	Has favourites	-805	170	-107	037	-189	-263	795
11.8	Expects too much	-614	268	-190	000	537	260	845
13.6	Sarcastic	-805	219	-109	-042	160	-278	806
28.3	Satisfaction Dichotomy I	370	016	202	907	102	-031	1005
67.0	Satisfaction Dichotomy II	400	068	043	912	-067	-062	1000
	Percent of Total Variance	25.40	16.20	20.23	7.22	4.27	3.78	76.91

INTERPRETATION OF THE FACTORS

Factor I is clearly general evaluation of the supervisor, and might fairly be equated with Fleishman's "Consideration" factor.

Factor II is similar in character to Factor II in the matrix on "the job"—having relatively uniform all positive loadings, except on the two Satisfaction Dichotomies, and has therefore been interpreted as a measure of subjects' tendencies to endorse either few or many items in total. The factor score derived for this factor is simply the total number of items endorsed.

Factor III is interpreted as a rating of the supervisor's "Efficiency".

Factor IV has significant loadings only on the two Satisfaction Dichotomies.

Factor V has two sizeable loadings "Full of ideas" and "Expects too much" but has not been used for further analysis.

No interpretation is offered for Factor VI which accounts for less than 4% of the variance

(Note. The choice of items for unit-weight scoring in this analysis is clearly less than optimal. This was due to further rotations being carried out after the selection of items for scoring weights).

MATRIX OF CHECK-LIST ITEMS ON "THE FIRM"

FREQUENCY OF ENDORSE- MENT PER CENT	ITEM	ROTATED FACTOR LOADINGS						h ² (UNRO- TATED)
		I	II	III	IV	V	VI	
14.4	Well run	761	365	000	325	-127	-552	1135
13.0	Efficient	676	583	098	047	-020	-123	823
19.6	Up-to-date	554	600	-084	021	-135	-126	707
33.7	Has a good reputation ..	551	400	246	274	069	000	599
46.1	A good firm to work for	548	286	367	380	025	073	667
14.3	Honest	542	586	028	278	047	242	772
20.7	Serves its customers well	535	664	183	-003	074	027	761
15.1	Respectable	477	563	113	004	-153	009	582
13.6	"Go-ahead"	454	628	-064	140	022	110	635
27.8	Friendly	441	333	428	211	-066	243	595
24.7	Looks after its employees well	407	385	411	434	028	058	671
16.6	Has a nice class of worker	376	456	310	390	-143	098	621
13.5	Has safe markets	352	582	241	-458	-033	-224	782
23.2	Offers secure jobs	347	546	353	062	015	-053	552
36.2	Good welfare	314	434	287	317	000	050	468
32.6	Makes a good class of product	254	600	285	131	036	-202	565
16.1	Good co-operation with trade unions	105	363	360	521	000	-276	617
32.4	Strict about time-keeping	011	538	-546	212	-083	061	640
18.5	Easy-going	-145	199	760	-151	-216	128	723
15.8	Changing	-231	275	-148	-212	190	097	242
14.1	Only out to make money	-377	501	-434	-356	000	143	724
13.2	Too many rules and regu- lations	-384	425	-686	-032	-020	090	798
11.7	Too set in its ideas	-437	469	033	-302	081	-120	521
15.7	Too much class distinction	-530	334	-250	-184	027	-131	502
10.5	Poor working conditions	-545	347	-230	-132	169	716	1029
15.8	They waste money on things we don't want..	-620	419	-122	-111	189	-136	634
24.1	Too many people in the offices	-657	379	-114	300	-090	-203	725
14.9	Needs some fresh people at the top	-662	420	-116	-175	063	-146	678
23.2	Poor planning	-669	311	091	-188	036	-072	597
12.7	Muddled	-720	213	176	-400	215	197	846
28.3	Satisfaction Dichotomy I	452	020	137	242	827	-040	959
67.0	Satisfaction Dichotomy II	388	000	270	232	827	-178	981
	Percent of Total Variance	23.71	19.63	9.48	6.99	5.28	4.43	69.22

INTERPRETATION OF THE FACTORS

Factor I is interpreted as a measure of respondent's evaluation of the "Efficiency" of the firm.

Factor II is the same sort of general factor of tendency to endorse many or few items as appeared in the two previous matrices.

Factor III appears to be related to "Discipline vs: Leniency".

Factor IV contrasts "Money orientation" with "Welfare orientation".

Factor V has large loadings on only the two Satisfaction Dichotomies.

Factor VI has only two substantial loadings, and the largest of these was used as a means of coding it for the second stage analysis.

(It should be noted that whereas the other matrices concerned with the job, the boss, and particular questions, cover people engaged in a wide variety of jobs, and working under

a large number of supervisors, the matrix on "the firm" is restricted to the contrasts amongst only five firms. It would, therefore, probably be desirable to repeat this analysis when sufficient data has been obtained from employees in a larger sample of firms.)

MATRIX OF "YES-?-NO" QUESTIONS

PERCENT GIVING UN- FAVOURABLE ANSWER	QUESTION	ROTATED FACTOR LOADINGS						h ² (UNRO- TATED)
		I	II	III	IV	V	VI	
16.0	Do you feel that you are too rushed by the speed of the work? (Yes) ..	056	837	148	180	093	-200	801
12.5	Do you feel you can work at your own speed? (No)	-020	809	170	221	-109	-261	806
10.7	Can you take a pause when you feel you need to? (No) ..	-089	856	116	006	175	-073	788
13.6	Does your work tire you out too much? (Yes) ..	145	511	200	372	480	-068	679
19.4	Do you find the time passes quickly? (No) ..	489	385	243	-061	421	-037	624
12.6	Do you feel too much "hemmed-in" by your work? (Yes) ..	504	387	103	110	473	087	654
31.5	Do you have too many bosses? (Yes) ..	220	392	637	021	182	171	665
19.4	Do you ever get bad headaches from your work? (Yes) ..	077	247	186	790	216	000	771
22.4	Is your job too monotonous? (Yes) ..	743	282	030	148	319	-194	799
26.6	Do you get enough change in your work from time to time? (No) ..	660	318	110	062	179	-127	609
36.9	Is your work often discouraging? (Yes) ..	625	393	155	151	142	270	680
23.0	Would you choose another "boss" if you could? (Yes) ..	210	255	755	-021	000	000	683
47.4	Are you satisfied with your earnings? (No) ..	400	374	422	-081	-165	282	581
38.7	Have you ever thought seriously about changing your job? (Yes) ..	624	240	270	314	-243	087	687
31.1	Do you ever get eyestrain from your work? (Yes)	086	090	164	869	134	032	823
19.8	Are you doing as well in your present job as you expected to? (No) ..	578	292	155	056	-561	200	808
54.4	Do you feel you are told enough about what's going on in the firm to "keep you in the picture"? (No) ..	270	071	685	296	-088	070	637
28.3	Satisfaction Dichotomy I	-654	073	-292	-031	-052	683	1009
67.0	Satisfaction Dichotomy II	-688	-178	-203	-062	-053	615	931
	Percent of Total Variance	20.35	18.92	11.15	9.81	7.10	6.63	73.87

INTERPRETATION OF THE FACTORS

In the case of this matrix respondents were required to answer "Yes", "?", or "No" to each question, and consequently there is no factor comparable to Factor II—i.e., tendency to endorse many or few items—in each of the three previous matrices.

Factor I in this matrix is clearly "Monotony" but has some loading of general job-satisfaction.

Factor II is clearly "Stress from pace of work", but has also considerable loadings of general job-satisfaction.

Factor III is "Criticism of Supervision".

Factor IV is "Health Stress".

No interpretation is offered for Factor V which accounts for 7.1% of the variance.

Factor VI has substantial loadings only on the two Satisfaction Dichotomies.

ROUTINE OF ANALYSIS

Second Stage

In the light of the above results, unit-weight scores were derived for twelve 'scales' consisting of the items having highest loadings (shown in bold type above) on each of the factors having several identifying items. In addition, scores were obtained for the 'number of items endorsed' on each of the three check-lists. The Hollerith machinery was programmed to punch out the resultant fifteen scores for each person, together with the single-item scores on items which singly identified factors in the previous analysis (i.e., 'Job is badly organized', 'Poor working conditions in the firm', 'Job is well paid', 'Dissatisfied with earnings', and the two Satisfaction Dichotomies).

These twenty-one scores were then cross-tabulated, and the cross-tabulations converted to product-moment, bi-serial, or tetrachoric correlations as appropriate, to provide the second-order correlation matrix.

The resultant matrix was then entered on a Mercury computer with a principal components programme, and the first ten components, which together accounted for 88.64% of the variance were extracted. These were then rotated graphically for psychological meaning, and the following results were obtained:—

SCALE OR ITEM	ROTATED FACTOR LOADINGS										UNROTATED h^2
	I	II	III	IV	V	VI	VII	VIII	IX	X	
Interest of Job	32	20	21	-03	21	00	82	-15	07	-17	93
Clean Work	-10	-07	91	-07	08	-22	01	10	-17	-24	98
Undemanding character of job	11	-04	10	-09	05	02	-31	80	41	09	92
Considerateness of Supervision	32	74	26	01	23	07	-23	10	-18	07	86
Efficiency of Supervisor ..	55	62	13	-08	24	-03	-03	05	-31	00	85
Efficiency of the Firm ..	11	38	30	27	74	06	-04	-13	-02	00	88
Leniency of Discipline in Firm	18	39	37	28	26	-15	13	-03	55	-09	80
Welfare orientation of Firm ..	34	27	36	36	44	16	-07	-10	33	-07	80
Speed pressure of the job ..	16	-47	46	-23	-22	-14	-32	-44	-32	04	97
Monotony of the job ..	23	-46	-37	-41	02	-29	-38	-10	-11	07	82
Health stress ..	23	-22	00	03	-21	05	-11	-09	88	98	98
Criticism of Supervision ..	23	-71	-28	-26	00	-15	05	09	-08	06	72
Dissatisfaction with earnings	17	-26	-22	-87	05	-24	-06	08	03	96	96
Job is well paid ..	41	07	01	76	17	07	00	28	-25	-14	94
Job is badly organised ..	43	-48	-34	-18	-51	-14	-16	06	02	-15	87
Poor working conditions in firm ..	54	-22	-37	-30	-53	17	-13	-22	-02	04	95
Satisfaction Dichotomy I ..	15	18	39	00	30	75	30	12	-22	02	100
Satisfaction Dichotomy II ..	06	20	43	03	26	68	42	24	-01	03	100
No. of Items about 'Job' endorsed ..	81	-10	-07	07	10	-05	10	09	-09	-01	70
No. of Items about 'Boss' endorsed ..	76	41	07	-15	07	-07	-05	12	-28	-05	86
No. of Items about 'Firm' endorsed ..	84	-05	05	02	15	13	-11	-12	17	-11	82
Percent of Total Variance ..	16.7	13.9	11.4	9.9	8.7	6.9	6.8	5.6	5.2	4.5	88.6

Interpretation of the factors (Bold face type above is used to indicate identifying loadings.)

Factor I is clearly related to respondents' tendency to endorse few or many items in the check lists. The highest loadings are on the three 'number of item' scores; other relatively high loadings appear on scales which have a predominance of positively scored items, and on the single item scores such as 'job is badly organized'; the negative loading of 'Clean Work' is in line with the fact that this scale has two negatively scored items and only one positively scored one.

Factor II is clearly concerned mainly with Supervision, but carried moderate loadings on five other scales, and thus appears to contain something akin to a 'General factor'.

Factor III is clearly mainly the 'Clean Work' scale.

Factor IV is clearly Satisfaction with Earnings.

Factor V is clearly the 'Efficiency of the Firm' scale.

Factor VI presents a problem of interpretation. It has only two large loadings—those on the two 'Overall Job-Satisfaction' scale dichotomies. It may therefore be due to the unity correlation between these two items, or it may represent residual variance in 'Overall Job-Satisfaction' not accounted for by the other factors.

Factor VII is clearly 'Interest of the Job'.

Factor VIII is 'Undemanding Character of the Job'; the negative loading of 'Speed pressure of the Job' reinforcing this interpretation.

Factor IX has some similarity to Factor VIII but is more inclusive and weaker, having loadings on 'Leniency of Discipline', 'Undemanding Character of the Job', 'Welfare Orientation of the Firm', and absence of 'Speed Pressure'.

Factor X is clearly 'Health Stress'.

APPENDIX III

WHICH WOULD YOU PREFER TO BE?

We are trying to find out about things that people value in life. One way of getting at this is to discover what people would like to be. But obviously nearly everyone wants to be rich, handsome, charming, clever, and so on, so we are asking people to decide which they would *prefer* to be.

On the following pages there a lot of pairs of words. You are asked to choose the *one* out of *each pair* which you would prefer to be true of yourself. For example:

Rich o o o o Amusing Generous o o o o Enterprising

The person who has answered these two has shown that he would certainly prefer to be rich than amusing, and although he would prefer to be enterprising than generous, he is not so sure about the choice.

Please work through the following pairs, underlining *one* circle from each pair, to show which *you would prefer* to be true of you. Underline the circle nearest the word if you feel certain, or one of the two middle circles if you find it more difficult to decide.

Remember we are asking which *you would prefer to be*, not which you think is the better description of what you are.

Don't spend very long over your choices, just go quickly through all the pairs.

Courageous	0 0 0 0	Popular		Generous	0 0 0 0	Happy	
Clever	0 0 0 0	Contented		Unconventional	0 0 0 0	Important	
Kind	0 0 0 0	Independent-minded		Conscientious	0 0 0 0	Calm	
Thorough	0 0 0 0	Rich		Sincere	0 0 0 0	Co-operative	
Unconventional	0 0 0 0	Well-educated		Decisive	0 0 0 0	Charming	
Popular	0 0 0 0	Contented		Intelligent	0 0 0 0	Tranquil	
Generous	0 0 0 0	Hardworking		Modest	0 0 0 0	Original	
Decisive	0 0 0 0	Important		Hardworking	0 0 0 0	Important	
Modest	0 0 0 0	Clear-thinking		Clever	0 0 0 0	Independent-minded	
Creative	0 0 0 0	Happy		Friendly	0 0 0 0	Calm	
Rich	0 0 0 0	Popular		Thorough	0 0 0 0	Kind	
Courageous	0 0 0 0	Clever		Courageous	0 0 0 0	Ambitious	
Conscientious	0 0 0 0	Friendly		Adventurous	0 0 0 0	Intelligent	
Sincere	0 0 0 0	Ambitious		Original	0 0 0 0	Tranquil	
Charming	0 0 0 0	Well-educated		Important	0 0 0 0	Charming	
Enterprising	0 0 0 0	Calm		Decisive	0 0 0 0	Well-educated	
Thorough	0 0 0 0	Independent-minded		Hardworking	0 0 0 0	Co-operative	
Clear-thinking	0 0 0 0	Successful		Kind	0 0 0 0	Rich	
Kind	0 0 0 0	Courageous		Popular	0 0 0 0	Clever	
Dependable	0 0 0 0	Intelligent		Courageous	0 0 0 0	Contented	
Decisive	0 0 0 0	Unconventional		Original	0 0 0 0	Conscientious	
Successful	0 0 0 0	Calm		Important	0 0 0 0	Well-educated	
Co-operative	0 0 0 0	Creative		Generous	0 0 0 0	Decisive	
Conscientious	0 0 0 0	Enterprising		Clever	0 0 0 0	Thorough	
Contented	0 0 0 0	Kind		Courageous	0 0 0 0	Independent-minded	
Creative	0 0 0 0	Ambitious		Ambitious	0 0 0 0	Tranquil	
Happy	0 0 0 0	Hardworking		Friendly	0 0 0 0	Original	
Generous	0 0 0 0	Charming		Dependable	0 0 0 0	Adventurous	
Enterprising	0 0 0 0	Friendly		Adventurous	0 0 0 0	Co-operative	
Well-educated	0 0 0 0	Happy		Clear-thinking	0 0 0 0	Calm	
Sincere	0 0 0 0	Creative		Generous	0 0 0 0	Unconventional	
Conscientious	0 0 0 0	Successful		Dependable	0 0 0 0	Ambitious	
Original	0 0 0 0	Intelligent		Creative	0 0 0 0	Clear-thinking	
Charming	0 0 0 0	Happy		Co-operative	0 0 0 0	Tranquil	
Modest	0 0 0 0	Conscientious		Sincere	0 0 0 0	Dependable	
Adventurous	0 0 0 0	Rich		Enterprising	0 0 0 0	Successful	

Remember we are asking *you which you would prefer to be*; not which you think is the better description of what you are.

Clever	0 0 0 0	Kind		Generous	0 0 0 0	Well-educated	
Unconventional	0 0 0 0	Calm		Contented	0 0 0 0	Independent-minded	
Successful	0 0 0 0	Friendly		Ambitious	0 0 0 0	Co-operative	
Clear-thinking	0 0 0 0	Enterprising		Sincere	0 0 0 0	Intelligent	
Dependable	0 0 0 0	Charming		Thorough	0 0 0 0	Popular	
Generous	0 0 0 0	Important		Successful	0 0 0 0	Modest	
Co-operative	0 0 0 0	Intelligent		Friendly	0 0 0 0	Clear-thinking	
Decisive	0 0 0 0	Happy		Adventurous	0 0 0 0	Tranquil	
Hardworking	0 0 0 0	Unconventional		Dependable	0 0 0 0	Creative	
Rich	0 0 0 0	Clever		Ambitious	0 0 0 0	Intelligent	
Sincere	0 0 0 0	Adventurous		Modest	0 0 0 0	Enterprising	
Conscientious	0 0 0 0	Clear-thinking		Hardworking	0 0 0 0	Well-educated	
Enterprising	0 0 0 0	Original		Creative	0 0 0 0	Adventurous	
Important	0 0 0 0	Happy		Rich	0 0 0 0	Contented	
Popular	0 0 0 0	Independent-minded		Charming	0 0 0 0	Unconventional	
Thorough	0 0 0 0	Courageous		Hardworking	0 0 0 0	Decisive	
Modest	0 0 0 0	Calm		Sincere	0 0 0 0	Tranquil	
Original	0 0 0 0	Successful		Rich	0 0 0 0	Independent-minded	
Tranquil	0 0 0 0	Dependable		Contented	0 0 0 0	Thorough	
Kind	0 0 0 0	Popular		Modest	0 0 0 0	Friendly	

I am male/female (Cross out which does not apply)

My age is.....years

The name of my present job is.....

I have been in my present job.....years

Two Methods of Studying Changes in Absence with Age

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INTRODUCTION

MOST studies of the connection between age and absence have taken a cross-section of people of different ages and compared their records during a particular period. These periods do not usually exceed 12 months.* The 'cross-sectional' method is often the only possible approach on practical grounds. However, groups of people with the same birth dates may have characteristics in common other than age, arising, for example, from their having grown up and started work in similar social and economic conditions. The cross-sectional method does not eliminate the possibility that any differences of absence rate between the groups may be due to such unidentified common characteristics. In this study, therefore, in addition to being analysed 'cross-sectionally', each group was followed 'longitudinally' over a ten year period, to test whether differences in absence between the groups revealed by the cross-sectional method also occurred within the groups as age increased.

Data and method

Absence records were made available by a firm engaged in medium to heavy engineering, employing approximately 300 men on manual work. Of these, 140 had been with the firm continuously since 1948. Absence records were available, in the same form, for the whole period 1949-58 inclusive. Absences were classified by the firm as sickness, leave, absence with reasonable excuse, or unauthorised absence. Date of birth and date of joining the firm were also recorded. As no information was available about changes in either size of family or income tax code numbers, it was not possible to examine the variable of family responsibility. As far as could be determined, no major changes in hours or type of work had occurred during this time. The records of the 140 continuous service men during the period 1949-58 formed the material of this study. The inclusion only of men with continuous service throughout the ten years reduced the size of the sample, but had the advantage of controlling the possible effect of differential labour turnover upon the absence rate.

The ages of the men on January 1st, 1949, ranged from 16 to 59 years. The sample was divided into four age groups each covering an approximate ten year span, so that the median age of one group at the end of the period

* Exceptions to this general rule are provided by Buzzard (1957) and Liddell (1954, who each used a period of three years.

was approximately equal to that of the next oldest group at the beginning of the period. The size, age range, and length of service of these groups are shown in Table I.

TABLE I: SIZE, AGE RANGE AND LENGTH OF SERVICE OF AGE GROUPS

AGE GROUP	NUMBER OF MEN	RANGE OF AGES	MEDIAN AGE AT 1.1.49	AVERAGE LENGTH OF SERVICE AT 1.1.49
1	20	16-25 years	23	1 yr. 5 mths.
2	51	26-35 years	31	6 yrs. 4 mths.
3	34	36-45 years	40	11 yrs. 4 mths.
4	35	46-59 years	51	13 yrs.

With this sample it is impossible to separate the variables of age and length of service without so curtailing the sample as to make it meaningless. However, the increase in length of service from age groups 1 to 4 does not invalidate the comparison of methods, as length of service also increases during the ten year period.

The level of absence of the whole sample was low, giving a very skewed distribution. To reduce this, a two- instead of a one-year period of time was used throughout the analysis. The data were thus divided into five two-year periods. Two measures of absence were used in the analysis: (a) the number of occasions (in which an absence of whatever length is considered as one occasion) and, (b) the average length of absence (given by the total days lost divided by the number of occasions of absence). These were computed for total absence, and also for the sub-divisions of sickness absence and absence for other reasons. Certified and uncertified sickness absence were treated separately. Other-reasons absence included the other three categories of the firm's classification, viz. leave, absence with reasonable excuse, and unauthorised absence. In calculating the average length of absences the effect of a few very long absences upon the average was reduced by adopting a cut-off point of 20 days.

Using these measures the data were first examined 'cross-sectionally' for the two year period 1949-50. Any consistent differences between age groups were then checked by following the relevant data 'longitudinally' over the ten year period. If the differences between age groups also appeared as changes within the groups as time went by, they could probably be considered as genuine ageing effects. If they did not appear in the longitudinal check, a need for greater caution in attributing the cause of the differences to age would be indicated.

RESULTS

A. Cross-Sectional (1949-50)

The average number of occasions of absence in the different age groups, both for total absence and for the sub-divisions of sickness absence (certified and uncertified separately) and other-reasons absence are given in Fig. 1.

This shows a decreasing frequency of absence as age increases up to group 3 (median age 40 years). It also shows this decrease to be due to a fall-off in the number of other-reasons absences, while the number of sickness absences remains fairly constant for all groups.

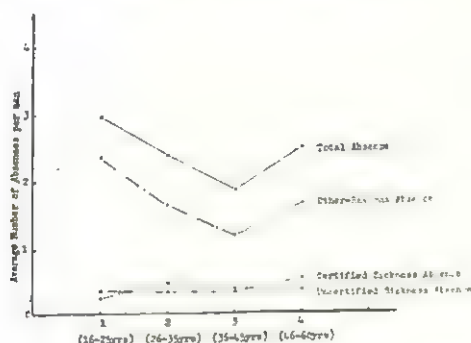


FIGURE 1. Variations with Age in Frequency of Absence
(1949-50)

That this reflects a genuine difference in distribution of absences between the groups and is not the result of the effect on the average of a few very high frequency absentees is shown by the distribution given in Table 2. This gives the percentage of people in each group having one or more other-reasons absences. This percentage is highest in group 1, while more than half of group 3 had no other-reasons absences during this two year period.

TABLE 2: DISTRIBUTION OF OTHER-REASONS ABSENCES IN DIFFERENT AGE GROUPS (1949-50)

AGE GROUP	NO. WITH 0 ABSENCE	NO. WITH 1 OR MORE ABSENCES	TOTAL
1	3 (15%)	17 (85%)	20
2	16 (31.4%)	35 (68.6%)	51
3	18 (52.9%)	16 (47.1%)	34
4	15 (42.9%)	20 (57.1%)	35
	52 (37%)	88 (63%)	140

The average length of the absences in different age groups is given in Fig. 2. This also shows the sub-divisions of certified sickness absence and other-reasons absence. Uncertified sickness absence has been omitted from this figure as, by definition, it is of not more than two days' duration. The average length in days of each absence is fairly constant for the first three age groups but increases sharply for group 4 (median age 51 years). The greater length of certified sickness absence in group 4 accounts for this difference as other-reasons absences maintain a fairly constant length throughout.

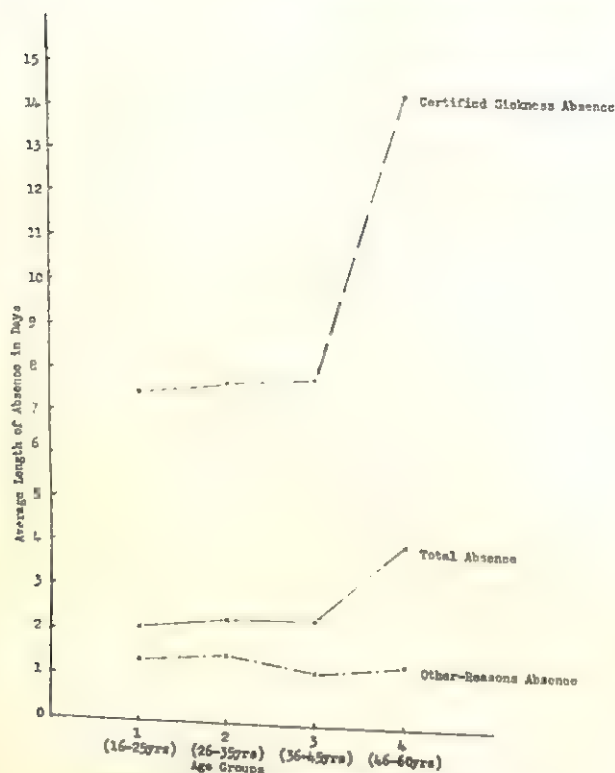


Figure 2 Variations with Age in Average Length of Absence
1949-50

A table showing the number of certified sickness absences of different lengths in each group is shown below (Table 3). The majority (71%) of certified sickness absences in group 1 is of one week or less, while the majority of those in group 4 (67%) is of more than two weeks.

TABLE 3: NUMBER OF CERTIFIED SICKNESS ABSENCES OF DIFFERENT LENGTHS IN EACH AGE GROUP (1949-50)

AGE GROUP	LENGTH OF ABSENCE			TOTAL
	3-5 DAYS NUMBER	6-10 DAYS NUMBER	11+ DAYS NUMBER	
1	5 (71%)	1 (14%)	1 (14%)	7
2	8 (47%)	6 (35%)	3 (18%)	17
3	4 (36%)	5 (45%)	2 (18%)	11
4	2 (11%)	4 (22%)	12 (67%)	18
	19 (35.8%)	16 (30.2%)	18 (34%)	53

B. Longitudinal (1949-58)

It now remains to follow the effects revealed by the cross-sectional method through the ten year period to see whether they occur within the age groups during that time. In dealing with a period of ten years it is possible that external factors of economic or social change may have affected

the overall absence level. We shall assume, however, that such factors would not affect differentially the different age groups. Because of the possibility of changes in the overall absence level with time, it is necessary to consider not the absolute level of any absence measure but the level of one age group relative to the rest. In this way each age group acts as a control for the other.

The cross-sectional method showed a decline in the number of occasions of other-reasons absences up to and including group 3 (see Fig. 1). This would lead one to expect a decrease with time in the frequency of absence for groups 1 and 2 relative to the older groups.

The actual frequencies for all groups when followed through the five two year periods are presented in Fig. 3. This graph shows no indication of the expected trend for groups 1 and 2. Indeed, the difference between group 1 and the two older groups increases rather than decreases, in spite of the increasing age of its members.

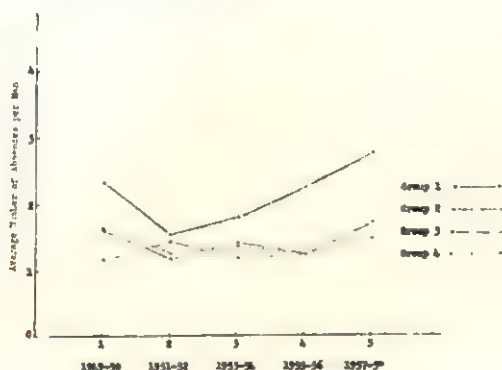


Figure 3. Variation with Time in Frequency of Other-Reasons Absences in Different Age Groups

Not only does this average frequency of absence fail to show the expected ageing trend, but the distribution of the absences within the group is also remarkably stable. Table 4 shows the proportion of people in each group having other-reasons absences in 1957-58 and compares this with the same data for 1949-50 as shown in Table 2.

TABLE 4: DISTRIBUTION OF OTHER-REASONS ABSENCES IN DIFFERENT AGE GROUPS 1949-50 AND 1957-58

AGE GROUP	NUMBER WITH 0 ABSENCES		NO. WITH 1 OR MORE ABSENCES		TOTAL FOR EACH PERIOD
	1949-50	1957-58	1949-50	1957-58	
1	3 (15%)	3 (15%)	17 (85%)	17 (85%)	20
2	16 (31.4%)	18 (35.3%)	35 (68.6%)	33 (64.7%)	51
3	18 (52.9%)	14 (41.2%)	16 (47.1%)	20 (58.8%)	34
4	15 (42.9%)	15 (42.9%)	20 (57.1%)	20 (57.1%)	35
	52 (37.1%)	50 (35.7%)	88 (62.9%)	90 (64.3%)	140

Such results indicate the need for caution in attributing the differences in frequency of absence found by the cross-sectional method to age differences between the groups. The higher frequency of absence in group 1 appears to be a continuing characteristic of that group rather than an effect of age or length of service.

In the matter of length of certified sickness absence, however, an ageing effect does seem to be apparent in the longitudinal data. Fig. 4 shows the average length of certified sickness absence for the four groups over the ten year period. The cross-sectional results (see Fig. 2) would lead one to expect an increase in length of this type of absence in group 3 as it approaches the age of group 4 at the beginning of the ten year period. Such an increase does in fact occur.

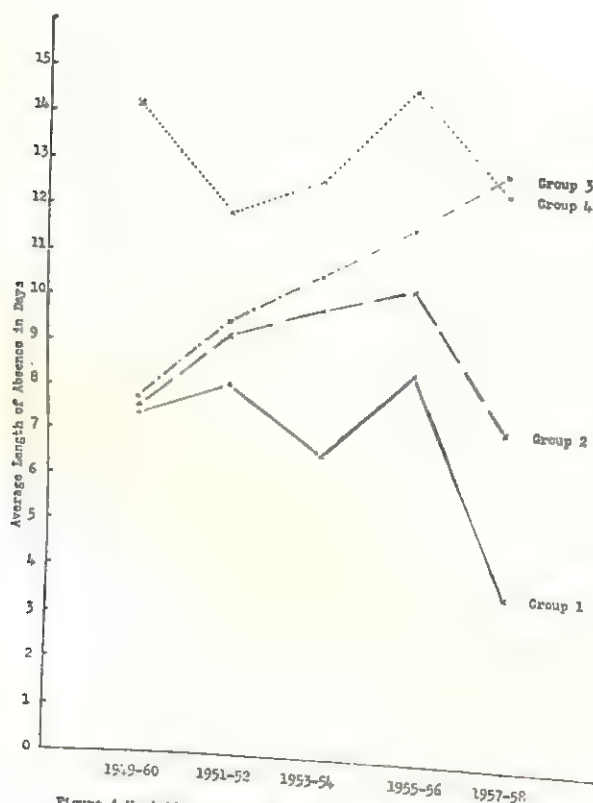


Figure 4 Variation with Time in the Average Length of Certified Sickness Absences in Different Age Groups

A table of the number of certified sickness absences of different lengths in group 3 for the five two year periods (Table 5) shows that the distribution of absences of different lengths in 1957-58 is approaching the pattern of that for group 4 in 1949-50 (shown in Table 3).

TABLE 5: NUMBER OF CERTIFIED SICKNESS ABSENCES OF DIFFERENT LENGTHS IN GROUP 3 (1949-1958)

YEAR	LENGTH OF ABSENCE			TOTAL
	3-5 DAYS NUMBER	6-10 DAYS NUMBER	11+ DAYS NUMBER	
1949-50	4 (36%)	5 (45%)	2 (18%)	11
1951-52	5 (33%)	5 (33%)	5 (33%)	15
1953-54	7 (41%)	3 (18%)	7 (41%)	17
1955-56	3 (20%)	6 (40%)	6 (40%)	15
1957-58	3 (18%)	5 (29%)	9 (53%)	17

During the period, the proportion of certified sickness absences of over two weeks has risen from 18% to 53% compared with a proportion for group 4 in 1949-50 of 67%. This seems to confirm the cross-sectional result that as age increases certified sickness absences tend to be of longer duration.

DISCUSSION

A cross-sectional analysis of the first period, 1949-50, showed (a) a higher frequency of other-reasons absence among younger men, and (b) greater length of certified sickness absence among older men. These results confirm the findings of other investigators using the cross-sectional method. For example, Behrend's (1959) 'Firm Z' showed a highest other-reasons absence rate for men below 30. Similarly Liddell (1959) found that the youngest men at one colliery lost more time voluntarily than their elders. In the case of sickness absence, Buzzard and Shaw (1952) reported a rise in the average number of days lost with age, while Denerley's (1952) sickness absence figures show a similar trend.

The aim of the present study was to check the assumption of the cross-sectional method that age differences between groups are the cause of behavioural differences. In the case of length of certified sickness absence this assumption is supported by the longitudinal method. There were indications at the appropriate age level of an increasing length of certified sickness absence as age increased, making it probable that this is, in fact, a true ageing effect.

In the case of frequency of absence, however, the suggestion of the cross-sectional method that high absence frequency is a characteristic of younger people is not supported by the longitudinal evidence. The higher absence frequency of the youngest group seems rather to be a continuing characteristic of this group, born between 1923 and 1933, which is not affected by age. Not only is there no indication of the beginnings of a decrease in their absence frequency as age increases, but there is, in fact, an increase in their divergence from the other groups.

One suggestion as to the nature of this characteristic is provided by an investigation carried out in the same factory into attitudes to work.* In

* Not yet published.

this, subjects were presented with a list of possible reasons for taking a day off from work under two sets of conditions, with and without loss of pay, and were asked to say which of these reasons were in their opinion justifiable. These subjects included a small number of the people in the ten year absence sample (five from each of groups 1, 2 and 4).

Under the first condition (loss of pay), group 1 gave a total of 17 'justifiabiles' in contrast to totals of 12 and 11 from groups 2 and 4 respectively. Under the second condition (no loss of pay), the total of 'justifiabiles' for group 1 rose to 24—an increase of 7—in contrast to an increase of 1 and 0 for groups 2 and 4. One interpretation of these results is that they indicate a difference in values or attitude to work among the groups, arising from their different social and economic experience. This in turn would account for variations in frequency of absence and for the failure of group 1 to conform to the absence pattern predicted for it by the cross-sectional analysis.

The conflict of evidence arising from the use of the two methods of studying changes in absence with age indicates that caution is needed in the interpretation of the results of cross-sectional studies. The differences shown by this method may be due to the age differences involved, but the possibility that other factors are operating must also be borne in mind.

ACKNOWLEDGMENTS

Our thanks are due to the firm concerned for their co-operation in making their absence records available to us, and to our colleagues in the Industrial Psychology Research Unit for their suggestions and criticism.

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Eysenck on Cattell

The Meaning and Measurement of Neuroticism and Anxiety. By RAYMOND B. CATTELL and IVAN H. SCHEIER. New York: The Ronald Press Company, 1961. Pp. 535. Price 91s.

HARD on the heels of his previous book, *Personality and Motivation Structure and Measurement*, comes Cattell's latest monograph, written in conjunction with I. H. Scheier. In many ways it continues the series of reports which Cattell has been issuing of the large-scale and very impressive studies carried out in his laboratory at Urbana during the last fifteen years or so; it resembles its predecessors by being in every sense of the word a weighty tome. There are 535 pages, the number of subjects covered is enormous, and so is the number of separate researches referred to. Cattell has found it necessary to include two appendices, one giving some details about the series of researches, data from which are quoted throughout the book, and the other a glossary of the often rather esoteric terms used by the authors of this book. Perceptive readers who find that keeping up with Cattell's work takes up a good deal of their time will note with some apprehension his warning of another book in the offing, entitled *Objective Personality and Motivation Tests*, which is to be written jointly with F. W. Warburton.

The book is difficult to review, even in the space generously provided by the Editor of this journal, because Cattell is more and more getting into the modern habit which began with plays having as their central character a non-hero, and has now led to the publication of what traditionalists might consider non-books. The contents cover such a wide variety of subjects, and are strung together so loosely in conformity with an over-all plan which is not always apparent to the reader, that any attempt to discover precisely what the evidence is for a given statement, or how it fits in with the general scheme, becomes extremely difficult. The task is not made easier by Cattell's dualistic habit of referring to factors sometimes in terms of a numerical system, sometimes in terms of a verbal system which requires almost as much acquaintance with his previous writings to understand. Indeed, it would probably be true to say that this book would be almost unintelligible on its own and without extensive familiarity with Cattell's previous writings. This is not to say that it would not be extremely rewarding for the expert reader, but for the average student, attracted by the title and imagining that he will find some general discussion and consideration of its facts and viewpoints, the impact is liable to be traumatic.

No reviewer could do justice to all the facts, theories and arguments in such a book; all that will be attempted here will be to discuss what seemed to be some of the more important conclusions, and to criticize what seemed to be some of the more obvious weaknesses. To start with Cattell's first major conclusion, then, it is very encouraging for the reviewer to note that the two quite separate streams of research represented by the work of Cattell's unit and that at the Maudsley Hospital have now agreed in

their main conclusions. Through the further analysis of second-order factors Cattell has finally come to the conclusion that the two main and most easily reproducible factors in the personality field are extraversion-introversion and neuroticism (which he prefers to call 'anxiety'). It has always been one of the main criticisms made of the factor analytic study of personality that different investigators obtain quite different results, depending on their preferred method of analysis, their choice of tests, and their choice of subjects. This has never been true, as was pointed out in a detailed comparative study of the evidence in *The Structure of Human Personality*, but at first sight it certainly seemed embarrassing that some analysts, such as Burt and the present writer, ended up with two or three factors, while others, like Cattell and Guilford, ended up with fifteen or sixteen (which in turn bore no relation or similarity to each other). Second-order factor analyses of Guilford's and Cattell's primary factors have revealed very clearly results and factors similar to those postulated by Burt and Eysenck, and it is notable that in some recent unpublished comparisons of the Cattell and Eysenck factors correlations of up to .8 have been found; this is strong confirmation of the belief that the factors are similar in fact, and not only in name. The wheel has, therefore, come full circle. If the results of factor analysis were suspect because workers using different methods, tests, and subjects produced entirely divergent results, then surely the fact that the point has now been reached where workers, using different methods of analysis, tests and subjects produce *identical* results can be put forward with some assurance as being favourable to the claims of factor analysts.

This agreement, as will be seen from the top diagram on page 132, also extends to the position of psychiatric nosological groups in the framework provided. It will be seen there that as in the comparable studies of Eysenck there is a progressive change from introversion to extraversion as we go from the dysthymic disorders through conversion hysteria to psychopathy, with all these groups, of course, being high on neuroticism. Psychosomatics too, as Sainsbury has found in this country, tend to be introverted but somewhat less neurotic than the other groups. Here again, therefore, the agreement is extremely encouraging, because it was arrived at by means of entirely different measuring instruments, and although there was no guarantee that the similarity of diagnostic label as between the United States and the United Kingdom referred to nosological entities at all similar to each other.

There is one additional point of resemblance yet which appears important to the reviewer. Results from the Maudsley have always shown that psychotic reactions are entirely dissimilar to neurotic ones, and it has been proposed that psychoticism as a personality dimension is orthogonal to neuroticism. Cattell confirms this view by comparing the factor profiles from his primary factors of neurotic and psychotic groups. He concludes "that the factors which distinguish adult neurotics from normals are *not* the same as distinguish adult psychotics from normals. . . . On this basis we can claim that neuroticism is a direction of abnormality distinct from

psychoticism . . . since adult psychotics can be shown to differ from adult neurotics in their psychometrically measurable characteristics". This confirmation is particularly welcome as the conclusion has often been criticized on clinical grounds by psychiatrists and psychoanalysts holding the belief that neurosis and psychosis were located along one dimension. It is difficult to see how such a conclusion could still be maintained in the face of Cattell's results.

One finding of Cattell's may seem to run counter to this remarkable degree of agreement. He ends his report of a large scale investigation of neurotic and normal subjects by saying that "it is found that the concept-label neurosis cannot be affixed to any single . . . factor; hence our multi-factor theory of the nature of neurosis. At least eight first order and two second order factors significantly discriminate between clinically judged neurotics and normals". This conclusion apparently contradicts the widely held view that neuroticism represents a single second-order factor type of dimension. However, the difficulty arises only from a different usage of words. Cattell goes on to say that "in contrast to neurosis, both trait and type definition attach the clinical concept of anxiety to a single second order factor . . . anxiety is only one of the neurotic-contributory factors, hence we conclude that anxiety is part but not all of neurosis which is a broader concept". It will be clear what has happened. What is normally called 'neuroticism', Cattell calls 'anxiety'; he finds that what amounts to a random sample of neurotics cannot be characterized by a single primary or second-order factor. This, however, is hardly surprising. A group of people who in any particular investigation represent the total population of 'neurotics' is on any count extremely heterogeneous, incomplete and biased. Its composition depends entirely on the method of selection. If this method simply combs the outpatient wards of mental hospitals or the waiting rooms of private consultants, then the majority of neurotics will be of the dysthymic type, because it is these who seek out treatment, driven by their fears and anxieties. If we were to include such places as borstals, brothels and prisons in our search, we would find a larger number of psychopathic individuals. It is not mysterious, therefore, that neuroticism, defined by Cattell in terms of simply the average behaviour of the particular sample studied by him, has no pretensions of being a unitary concept. If a similar type of sampling had been attempted at the Maudsley, it is safe to say that similar results would have been obtained. It is unfortunate that Cattell has chosen to use the same terms ('neuroticism' and 'anxiety') which play such a large part in the work of other investigators, but has changed their meaning around in such a way that what they call neuroticism, he calls anxiety, and what they would call anxiety he calls neuroticism. The innocent reader might be sorely perplexed to understand Cattell's work and that of others if he failed to pay attention to this important point.

There is only room for one or two controversial points. Cattell relies very much on factor analysis, occasionally attempting to integrate it with

psychoanalytic concepts. This integration, being almost purely semantic, does not strike one as very convincing, and psychoanalysts have been rather chary of accepting the olive branch held out by this otherwise resolute empiricist. To the reviewer the lack of any theoretical concepts and development is the weakest point in Cattell's work and probably marks the strongest contrast between it and the kind of research carried out at the Maudsley. "A correlation coefficient is a confession of ignorance", Thurstone once said, meaning that the knowledge that a relationship exists between two variables tells us nothing about the all-important causal relations between them. Much the same comment may be made about a factor loading, and the failure of Cattell's work to be more widely accepted by personality theorists and others is possibly due, in part at least, to his failure to link up his descriptive factors with causal theories culled from learning theory.

Another comment which occurs to the reviewer relates to the almost insuperable difficulty the reader has in assessing the value of much of the evidence. Thus Cattell uses many physiological, autonomic, biochemical and other measures in his work, but he never publishes sufficient detail to make it possible to duplicate the work or to judge it properly. Physiological measures in particular are so dependent on the precise conditions of measurement (temperature, electrode paste, wiring diagram, *et cetera*) that failure to specify these in the greatest possible detail presents the reader with considerable difficulties of interpretation. It is difficult to find an answer to this problem; giving all the required detail would make the book at least twice as long, and would probably make it impossible to publish at all. Possibly the next book will give details of the kind required. Even then, however, there are many questions and doubts that remain in one's mind. The precise details of many of Cattell's objective tests (length of practice, length of rest pause, *et cetera*) seem to have been arrived at on an almost arbitrary basis; yet they may profoundly determine the actual results obtained. One would often like to have a detailed discussion of the reasons for choosing one set of values for the experiment rather than another, and indeed one often feels that a test should not be made part of a large battery before it has been investigated for its own sake in very considerable detail.

The slightly critical tone of this review should not mislead the reader into thinking that Cattell's new book is anything but a truly important and exciting contribution to the literature on the objective measurement of personality. In some ways Cattell has taken a path in his work which is different from that which the reviewer would have preferred, but on such points it would be foolish to be dogmatic. What cannot be doubted is that Cattell is in the very forefront of all those attempting to make the study of personality into a scientific branch of psychology, or that this new volume represents an important step in this endeavour.

Book Reviews

Psychological Tests and Personnel Decisions. By LEE J. CRONBACH and GOLDINE C. GLESER.
Urbana : University of Illinois Press, 1957. Pp. x + 165. Price 30s.

Psychological Tests and Personnel Decisions is a highly important book and the present writer at first declined an invitation to review it on the ground that he had not sufficient qualifications in mathematics and test theory to do it justice. This remains true. Nevertheless the mathematics are not quite impenetrable, and in any case although the equations and graphs are necessary to their case the authors invariably repeat their points in plain language and drive them home with most admirably chosen and varied examples. Their writing, too, is excellent, far above that of the average psychological text. It is to be hoped, therefore, that no potential reader will be deterred by the mathematical notation from this most interesting, concentrated and original work.

It would be impossible to summarise so closely argued a book but the following very simplified statement may serve to indicate something of its character. We have become accustomed, say the authors, to think of tests exclusively as measuring instruments, often regrettably erroneous ones. On the theoretical side this has prevented the development of a proper theory of testing. On the other side, it has led the practical man to think of each test as having a validity which he can ascertain before he commits himself to using it. He will be aware of the importance of the selection ratio and probably of other considerations as well, but essentially he will be guided by what he believes to be the validity of the test (or tests in combination).

On the contrary, the authors argue, a test is not a measuring instrument but an aid in making decisions about alternative courses of action; and the essential in developing a worthwhile view of tests and testing is to start from consideration of decision problems. Some decision problems are more important than others. Because of this, and also to avoid too highly generalised a model, the book is concerned especially with institutional (as opposed to individual) decisions where each person is assigned to one treatment and where a quota may or may not be enforced. "Treatment", of course, may mean almost anything: rejection, acceptance, military training, therapy, schooling, acceleration, support, etc. etc. Within this rubric there are eight possibilities:

(i) Reject decisions allowed; univariate information; single stage testing.
This is the common selection problem.

(ii) As above, with sequential testing.

(iii) No person rejected; univariate information; single-stage.
These are placement and measurement problems.

(iv) Sequential placement.

(v & vi) Multivariate information; single stage; rejection may or may not be allowed.
This is the classification or allocation problem.

(vii & viii) Sequential classification.

The book considers each of these eight possibilities in turn, together with many other points and distinctions. It becomes crystal clear as the argument proceeds that the value of a test 'can be stated only in terms of the specific type of decision problem, the strategy employed, the evaluation attached to the outcome, and the cost of testing'. (On the last two points practically-minded readers might find it of interest to turn to an article, now presumably forgotten, by Patrick Slater in the 1946 volume of this Journal.)

The great difficulty in the way of immediate acceptance and use of Cronbach and Gleser's approach is stated in their own words: "As compared with alternative theories, decision theory has one distressing characteristic. Instead of the definite formulas and procedures for test construction which other theories offer, decision theory is a general model for stating any particular testing problem. With certain commonplace assumptions we can generally derive formulas expressing the value of a test and principles for designing efficient tests. The formulas, however, involve so large a number of parameters that they are difficult to comprehend, and many of them can be evaluated only

by numerical integration. As compared with the algebra of measurement theory or the discriminant function, the mathematics of decision theory is involved and laborious. This is the price paid for bringing in the parameters required to describe a problem rigorously. Where this price is too high, the tester can make simplifying assumptions to obtain approximate answers to his questions. Decision theory states the questions comprehensively, and thereby reduces the likelihood that an inadequate approximation will be taken as an exact and final answer." One must hope that, despite the vested interest in measurement theory, courses in applied psychology of all kinds will quickly adopt the new approach, and that new and good texts will appear as soon as possible. Meanwhile, in job organisation or in judging personnel processing of any kind, from therapy to different kinds of leadership, should make the effort to tackle this volume. In addition to its main argument it contains a wealth of wisdom on such topics as sequential testing, differential prediction, test-treatment interaction, adaptive treatments, cutting scores, true costs of selection, test length, error content of tests, and the criteria for judging 'wideband' instruments such as interviews, essays and projective tests. N. A. B. WILSON

Anxiety in Elementary School Children. By S. B. SARASON, K. S. DAVIDSON, F. F. LIGHTHALL, R. R. WAITE and B. K. RUEBUSH. New York: John Wiley, 1960. Pp. 351. Price 62s.

Six years of research are described in a curiously autobiographical style, which might be of value to students beginning an elementary course in research techniques. Certainly the detailed accounts of most of the authors' experiments would satisfy anyone who wished to replicate them.

The discussion of test-taking attitudes and the review of previous work on school phobia are useful and well written. In fact, the most notable feature of this book is the language and style, which make it highly readable for the teacher who is perhaps not versed in the methodology and jargon of experimental psychology.

This makes it all the more unfortunate that the review of studies of the effects of anxiety upon intellectual performance contains some notable omissions. For example, although the central theme of this book revolves around the problem of the effects of anxiety upon learning and problem solving, the work of Eysenck and his school is not even mentioned. As the authors' findings often conflict with Eysenck's important contributions, one would have expected that at least some notice of this fact would have been given to teacher-readers who might not be aware of all the work in this field.

Despite the scientific halo produced by very many pages of results of hypotheses relating to the major one that anxiety is 'primarily interfering in its effect upon intellectual performance', the authors often appear to depart from an objective approach to their problem. For instance, in one experiment no significant difference was found between highly anxious and less anxious children, although one had been predicted. It seems an odd kind of hypothesis-testing when this leads to the conclusion that 'the data certainly do not contradict the hypothesis'. A correlation between social class and test anxiety significant at the .001 level went against the authors' expectations and is described as 'modest', but, elsewhere in the book, correlations of a similar level of confidence between their test of test anxiety and teachers' ratings are said to be 'encouraging, if not somewhat remarkable'.

These departures from objectivity are especially notable in their use of the term 'defensiveness'. When the data do not support the authors' hypotheses, the subjects' defensiveness is said to be concealing the true level of anxiety, but if their predictions are fulfilled, then the data appears to be acceptable at face value.

Many fascinating problems of the relationships between emotion and learning are raised by this book, and it may have value in stimulating discussion among teachers, or further experimental work—perhaps by researchers with more practical knowledge of learning and teaching in the primary school classroom, and less of a fixed idea that anxiety is necessarily an impediment to problem-solving efficiency. JOHN DOWNING

Human Factors in Jet and Space Travel. Edited by S. B. SELLS and C. A. BERRY. New York: The Ronald Press Company, 1961. Pp. xvi + 386. Price 91s.

The form of this book is unusual. Although it is described as 'a sourcebook', and as 'a Medical-Psychological analysis', it has more of the nature of a symposium, as there are fourteen chapters by thirteen different authors. Some of these chapters deal with a single clearly defined topic such as radio-biology or group behaviour, whereas others range over large and sometimes scattered areas in the field. The first chapter, for example, deals with the nature of aviation medicine, the nature of flight, the stresses of flight, and the probable course of development of space flight. Chapter five deals with servo theory, displays of information, and the effects of acceleration, hypoxia, and temperature. There is considerable overlapping of the coverage of different topics by the different authors. The subject of oxygen, for instance, is discussed to some extent in most of the chapters. These are aspects of a general disorderliness that considerably impairs the efficiency of the book as a source of information. Many of the discussions on isolated topics are excellent in themselves, but one gets a feeling of being lost when reading through them in the book. The authors also differ to a disturbing extent in their literary styles and in their abilities to select pertinent information and to express themselves clearly. The lack of organization and consistency in the book suggests that the editors have not given much attention to the reader's point of view in their work, and have not recognized that there are human factors to be considered in editing a book as well as in designing an aircraft.

The occupational psychologist interested in aviation will find a good deal of useful information about the environment of flight and the associated physiological considerations. Chapter eleven, which is the largest chapter, by itself summarizes many of the essential topics of aviation medicine.

About a third of the book is devoted to topics of major interest to the psychologist, such as group behaviour, accidents, skilled performance and the display of information. Of these topics, group behaviour is given the most thorough attention, in a chapter of its own with 41 references. The chapter on skilled performance, on the other hand, is treated in a general way and does not contain any reference at all to post-war research in aviation skills. Perhaps the most interesting chapter for the psychologist is that entitled 'Human Operator Performance Under Non-normal Environmental Operating Conditions', because it contains descriptions of three different modern approaches to the problem of designing an integrated display of information for pilots, namely the Hughes Aircraft Company Instrumentation Program, the (US) Air Force Integrated Instrument Panel, and the (US) Army-Navy Instrumentation Program. These descriptions are supported by a discussion of the principles involved.

It is disappointing that much of the space devoted to psychological topics has been allotted to authors who are apparently not psychologists. The author of chapter eleven, for example, presents a mainly neurological point of view of human activity. Incidentally, he considers that 'aptitude tests are at best only indirect measures of motivation'.

Several of the major topics that one would like to find in a book on human factors in this particular occupation are given little or no attention. Among these are the history of aviation medicine, air-crew selection and training, the use of flight simulators, research methods in the study of air-crew performance, an analysis of the aviator's task (one author who attempts this gives an erroneous description of how an aeroplane is made to turn in flight), and the basic characteristics of the human operator. Above all, there is no real attempt in this book to think about and to describe the real men who fly in jet aircraft and space vehicles. In other words, there is very little about what it is actually like to be an aviator, what the pilot has to do and what conditions of work he has to adjust to.

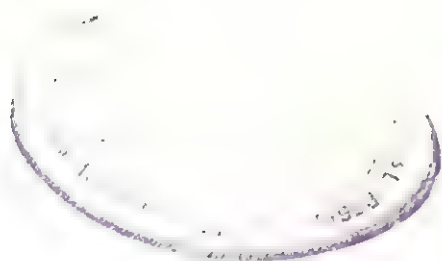
K. F. JACKSON

Other Books Received

The following books have been received. Their inclusion in his list does not preclude their review later.

- Functions, Standards and Qualifications for Occupational Health Nurses.* By AMERICAN NURSES' ASSOCIATION. New York: American Nurses' Association, 1961. Pp. 32.
- Staff Reporting and Staff Development.* By E. ANSTEY. London: Royal Institute of Public Administration in collaboration with George Allen and Unwin, 1961. Pp. 96. Price 12s. 6d.
- Training for Research in Psychology. The Canadian Opinion Conference, May, 1960.* Edited by KARL S. BERNHARDT. Toronto: University of Toronto Press (London: Oxford University Press), 1961. Pp. xi + 130. Price 32s.
- Seebohm Rowntree.* By ASA BRIGGS. London: Longmans, Green, 1961. Pp. x + 371. Price 30s.
- Personality and Social Interaction.* By ROBERT H. DALTON. Boston: D.C. Heath (London: Harrap), 1961. Pp. vii + 381. Price 48s.
- Précis de Statistique.* By S. EHRLICH and C. FLAMENT. Paris: Presses Universitaires de France, 1961. Pp. 214. Price N.F. 10.
- The Role and Functions of Industrial Relations in the Business Organization.* By WALDO E. FISHER. Pasadena: California Institute of Technology, 1961. Pp. 36. Price \$2.50.
- Studies in Personnel and Industrial Psychology.* Edited by EDWIN A. FLEISHMAN. Illinois: Dorsey Press, 1961. Pp. xi + 633. Price not yet available.
- The Rhetoric of Science.* By ROY G. FRANCIS. Minneapolis: University of Minnesota Press (London: Oxford University Press), 1961. Pp. vii + 183. Price 38s.
- The Anatomy of Work.* By GEORGES FRIEDMANN. London: Heinemann, 1961. Pp. xxiii + 203. Price 25s.
- Ageing and the Semi-Skilled: A Survey in Manufacturing Industry on Merseyside.* By ALASTAIR HERON and SHEILA M. CHOWN. Medical Research Council Memorandum. No. 40. London: H.M.S.O., 1961. Pp. viii + 59. Price 5s.
- Conditioning and Learning.* By E. R. HILGARD and D. G. MARQUIS. Revised by GREGORY A. KIMBLE. London: Methuen, 1961. Revised Edition. Pp. ix + 590. Price 60s.
- Report Writing in Psychology and Psychiatry.* By JACK T. HUBER. New York: Harper, 1961. Pp. x + 114. Price \$3.50.
- Personnel Management Salaries.* By the INSTITUTE OF PERSONNEL MANAGEMENT. London: Institute of Personnel Management, 1961. Pp. 32. Price £1 1s.
- Working with Groups.* By JOSEPHINE KLEIN. London: Hutchinson, 1961. Pp. 240. Price 35s.
- Employing Married Women.* Occasional Paper No. 17. By VIOLA KLEIN. London: Institute of Personnel Management, 1961. Pp. 51. Price 7s. 6d.
- The Historical Development of British Psychiatry. Volume 1. 18th and 19th Century.* By DENIS LEIGH. London: Pergamon Press, 1961. Pp. xiv + 277. Price 70s.
- Problems in Vocational Counseling.* By LLOYD H. LOFQUIST and GEORGE W. ENGLAND. Iowa: Wm. C. Brown, 1961. Pp. xxii + 186. Price \$3.50.
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PUBLICATION TRIMESTRIELLE

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Rédaction et Administration: Square Jouvenet, PARIS 16°
Abonnement (un an) France: 15 NF, Etranger: 18 NF.

Règlements au nom de la Sté André VIDAL & Cie, 15 rue Henri-Heine, PARIS 16°
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